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(NASA-TM-X-69505) GROUND OPERATIONS
AEROSPACE LANGUAGE (GOAL): SYNTAX
DIAGRAMS HANDBOOK (NASA) 55 p HC \$4.75

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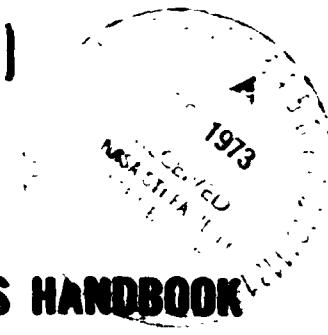
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GROUND OPERATIONS
AEROSPACE LANGUAGE
(GOAL)

SYNTAX DIAGRAMS HANDBOOK



GROUND OPERATIONS AEROSPACE LANGUAGE (GOAL)

SYNTAX DIAGRAMS HANDBOOK

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PREFACE

GROUND OPERATIONS AEROSPACE LANGUAGE (GOAL)

GOAL SYNTAX DIAGRAMS HANDBOOK

This handbook contains an alphabetical arrangement of syntax diagrams used in the Ground Operations Aerospace Language (GOAL). Descriptive writeups for the syntax diagrams are not included in this handbook; they are included in the GOAL Textbook. For background information about GOAL, refer to the GOAL Overview Document which relates the historical development of GOAL and provides a summary of features and capabilities of the language.

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FEEDBACK LETTERS VERSUS DIAGRAM CHART

LETTER	PROPOSED VALUE	DIAGRAM NAME
A		Declare Data Statement
B		Declare Data Statement
C		Record Data Statement Request Data Statement
D		Activate Table Statement Inhibit Table Statement
E		Apply Analog Statement Issue Digital Pattern Statement Set Discrete Statement
F		Leave Statement Perform Subroutine Statement
G		Release Concurrent Statement
H		Stop Statement
I		Disable Interrupt Statement
J		Begin Macro Statement Expand Macro Statement
K		Begin Subroutine Statement
L		Free Data Bank Statement Use Data Bank Statement
M		Specify Statement
N		Specify Statement
P		Character String
R		Function Designator
S		External Designator
T		Name
W		Macro Label
Y		Revision Label

FEEDBACK LETTERS VERSUS DIAGRAM CHART (CONTINUED)

LETTER	PROPOSED VALUE	DIAGRAM NAME
AB		Step Number
AC		Numeric Formula
AD		Integer Number
AE		Binary Number
AF		Octal Number
AG		Hexadecimal Number

DIMENSION TABLE Engineering units available for use in GOAL are listed in the following matrix.

FUNCTION TYPE	BASIC UNIT	$\times 10^0$	$\times 10^3$	$\times 10^6$	$\times 10^{-3}$	$\times 10^{-6}$
volts ac/dc	volt	V			MV	UV
current ac/dc	ampere	A			MA	UA
	hertz	HZ	KHZ	MHZ		
frequency	pulses per second	PPS	KPPS			
	day	DAY				
	hour	HR				
time	minute	MIN				
	second	SEC			MSEC	USEC
resistance	ohm	OHM	KOHM	MOHM		
inductance	henry	H			MH	UH
capacitance	farad	FD				UFD
	watt	W	KW		MW	UW
power	voltage, current or power	DB				
ratio	percent	PCT				
	pounds per square inch	PSIG PSIA PSI				
pressure	millimeters of mercury	MMHG				
	inches of mercury	INHG				
	millibars	MB				
	inch	IN				
distance	foot	FT				
	meter	M	KM		MM	
	nautical mile	NM				
	feet per second	FT/SEC				
velocity	meters per second	M/SEC				
	knot	KT				
	mach no.	MACH				
angle	degree	DEG				
	arcmin	ARCMIN				
	arcsec	ARCSEC				
	radian	RAD			MRAD	
	revolution	REV				
temperature	degrees centigrade	DEGC				
	degrees fahrenheit	DEGF				

CAUTION - The writer must take necessary precautions to insure the consistent use of compatible dimensions.

Other allowable dimensions are:

KILOVOLTS (AC or DC)	KV
DECIBELS above one milliwatt	DBM
DECIBELS above one watt	DBW
KILOVOLT AMPERES	KVA
VOLT AMPERES REACTIVE	VAR
KILOVOLT AMPERES REACTIVE	KVAR
PICOFARADS	PFD
MASS (grams)	G
ACCELERATION	M/SEC/SEC FT/SEC/SEC

If the full name of the basic unit DIMENSION is used,
then either plural or singular will be allowed.

EXPLANATION OF GOAL SYNTAX DIAGRAMS

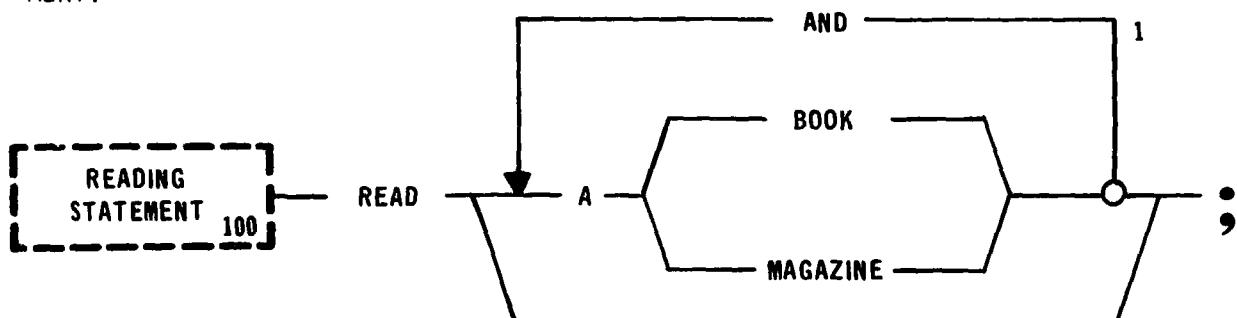
To illustrate the allowable variations of each GOAL statement, a presentation method using syntax diagrams was selected.

Syntax diagrams identify legal sequences of items in a GOAL statement, including alternate branches, optional entries, and feedback loops.

Some basic rules for using syntax diagrams are:

- Syntax diagrams are read from left to right except for feedback loops.
- — is a connecting path and indicates that the insertion of blanks and/or comments is allowed.
- Capital letters must be used as shown.
- Diagonal lines are alternate forward paths.
- A bubble indicates the start of a return (feedback) path.
- A numeral at the beginning of a return path indicates the maximum number of times a path may be taken.
- A letter at the beginning of a return path indicates the number will be assigned after a system is selected.
- Syntax notes provide semantical explanation.
- GOAL statements are terminated by a semi-colon.
- A syntax diagram reference number is placed in each syntax unit.

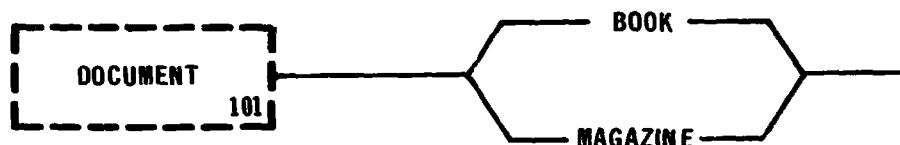
The following is an example of a syntax diagram illustrating a "READING STATEMENT."



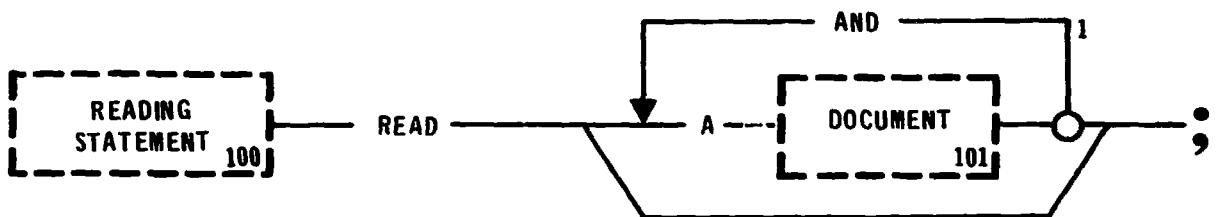
This allows any of the following sentences to be written:

```
READ;  
READ A BOOK;  
READ A BOOK AND A MAGAZINE;  
READ A MAGAZINE AND A BOOK;  
READ A BOOK AND A BOOK;  
READ A MAGAZINE AND A MAGAZINE;
```

If the use of "BOOK" and "MAGAZINE" appeared the same way in several diagrams and represented a logical grouping, then a new syntax unit could be created.



The above diagram would then become:



The dashed box represents a syntax unit. The syntax unit on the left is being defined in terms of "characters" and other syntax units.

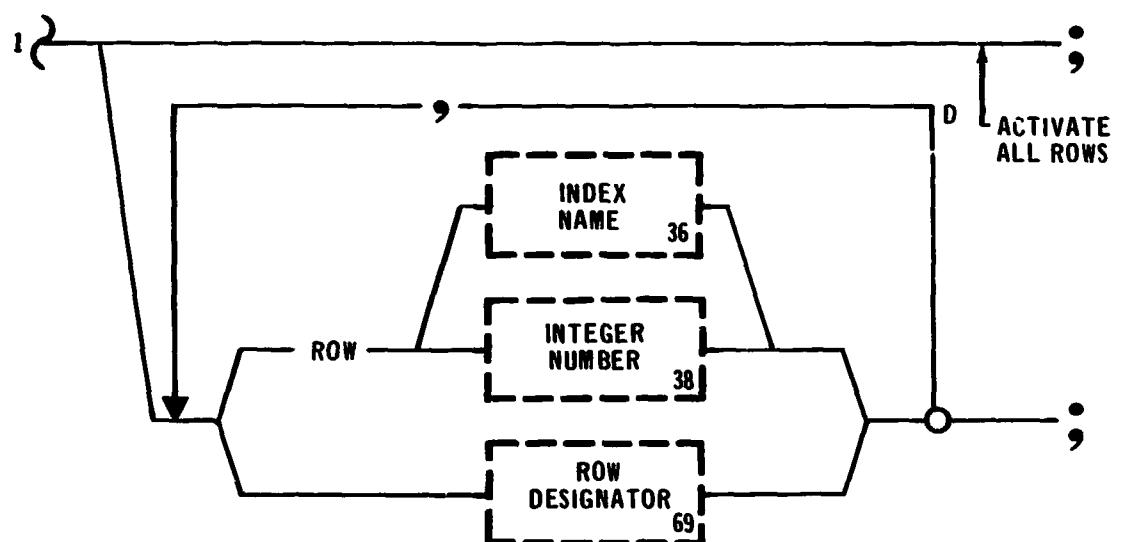
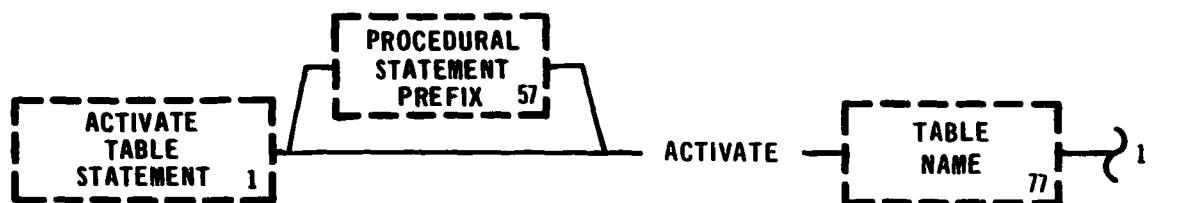
To facilitate the location of any syntax diagram in this handbook, an INDEX OF SYNTAX DIAGRAMS on page "iii" lists the initial words of the diagram name, the number of the diagram, and the page where it is located. A FEEDBACK LETTERS VERSUS DIAGRAM CHART on pages "iv" and "v" list the letter annotations on diagram feedbacks and the appropriate definition of each letter. Page "vi" is a table of dimensions allowed when referenced by a syntax diagram.

By convention, when writing GOAL Statements, the letter " \emptyset " should be slashed and the numeral "0" should not be slashed. This convention is not shown in the Syntax Diagrams.

1
REV 0

ACTIVATE TABLE STATEMENT

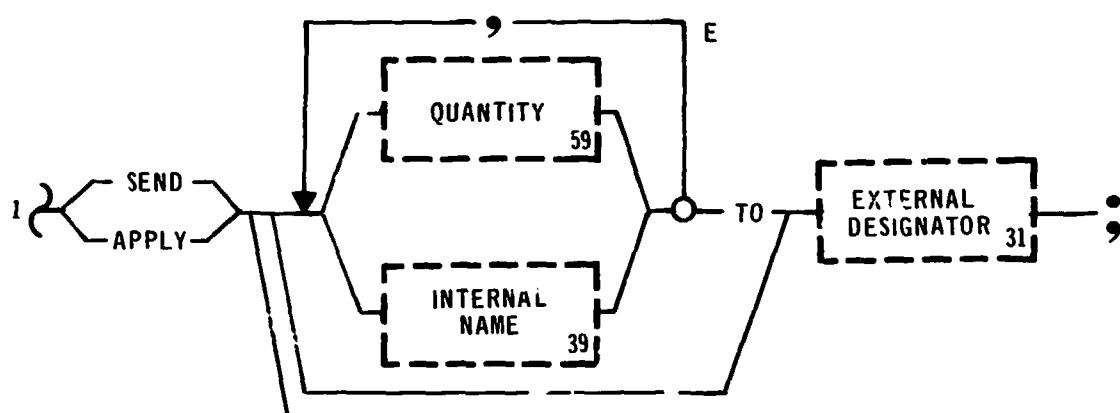
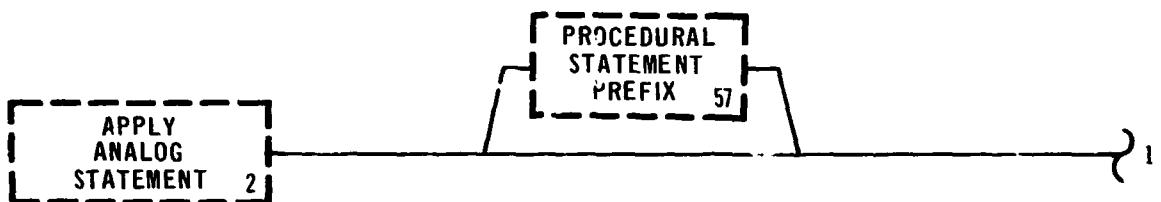
ACTIVATE



2
REV 0

APPLY ANALOG STATEMENT

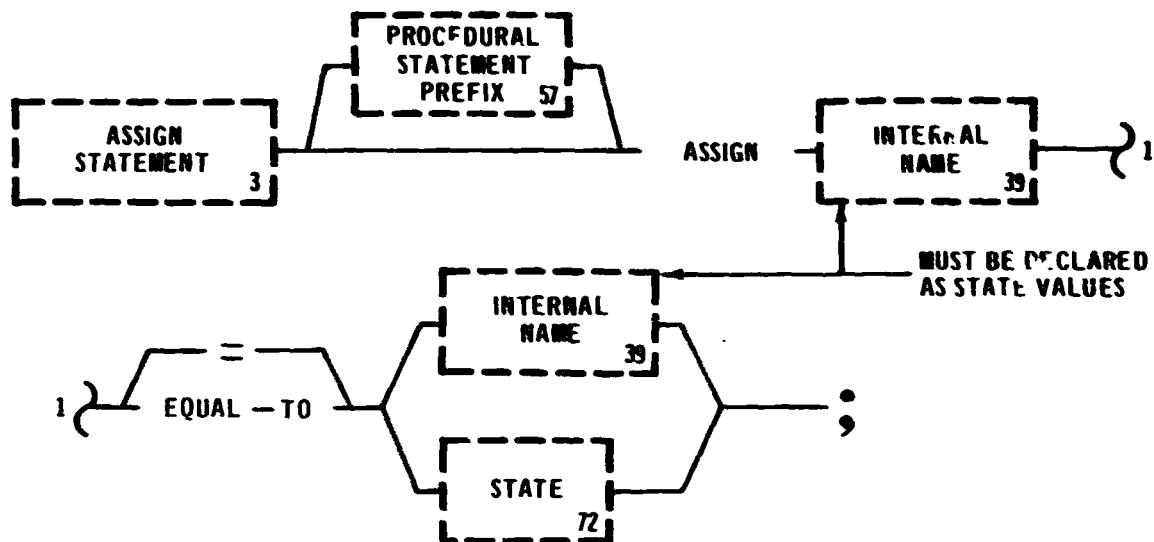
APPLY



3
REV 0

ASSIGN STATEMENT

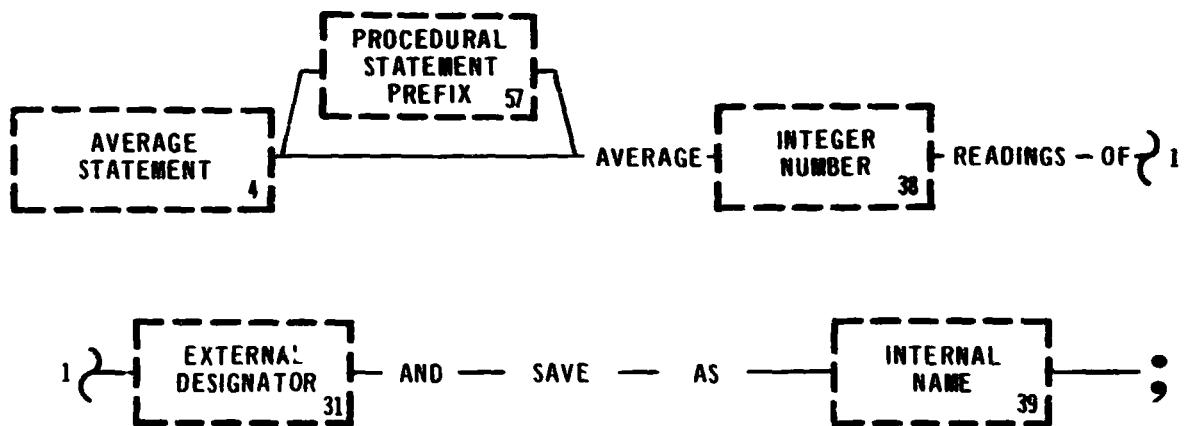
ASSIGN



4
REV 0

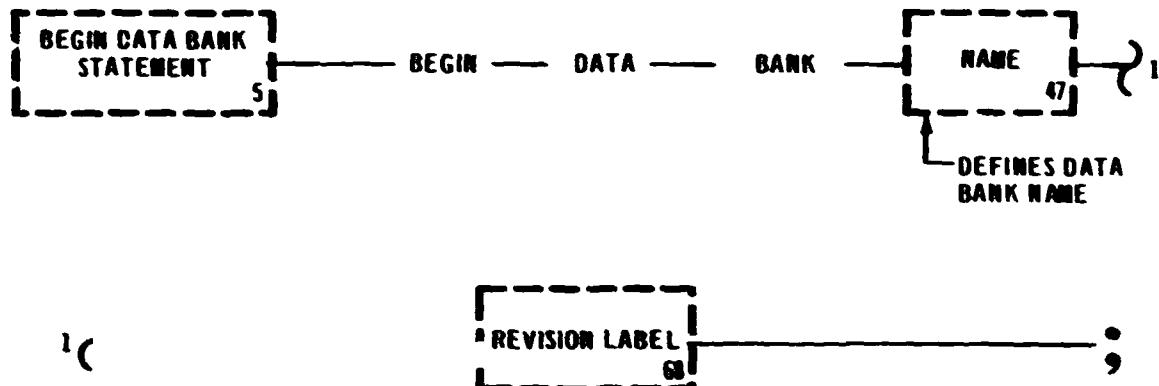
AVERAGE STATEMENT

AVERAGE



5
REV 8

BEGIN DATA BANK STATEMENT



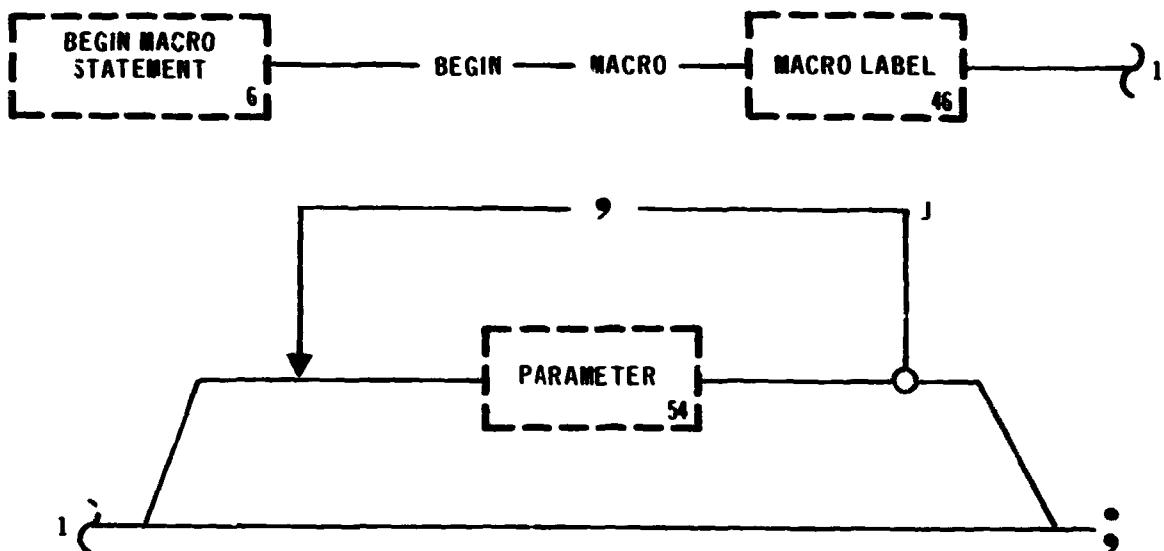
BEGIN DATA BANK

DEFINES DATA
BANK NAME

BEGIN MACRO

6
REV 8

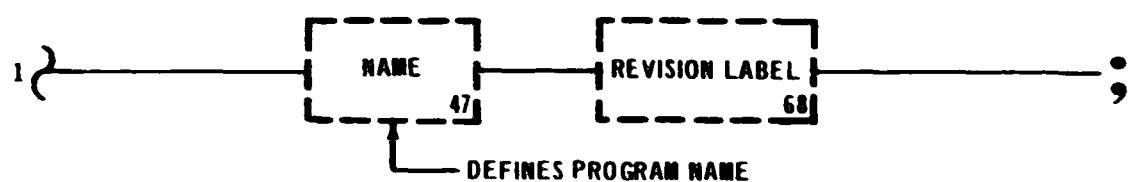
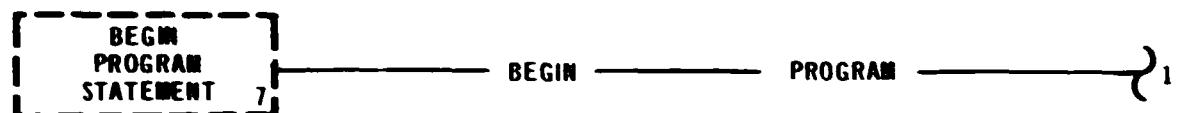
BEGIN MACRO STATEMENT



7
REV 0

BEGIN PROGRAM STATEMENT

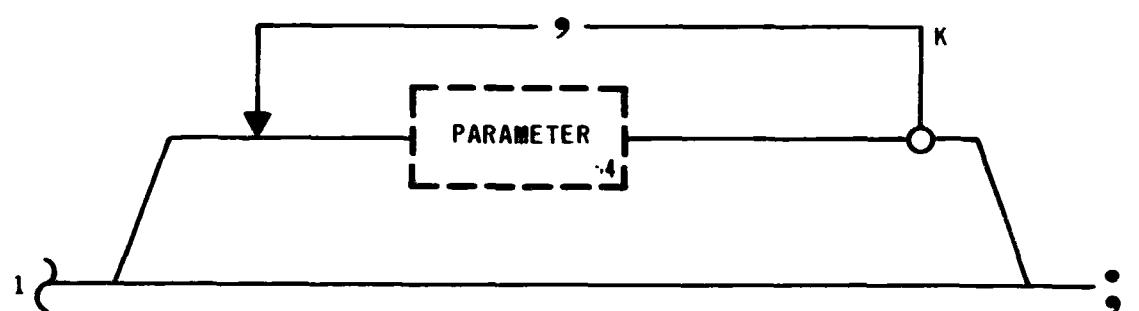
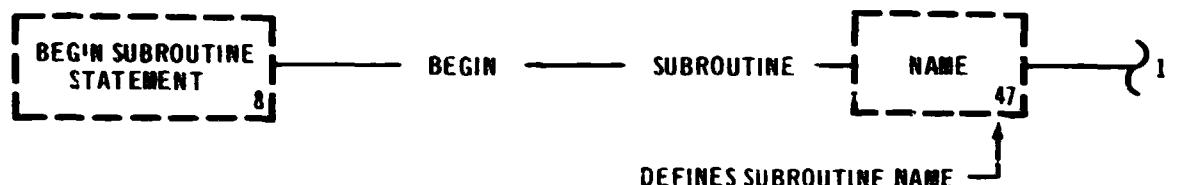
BEGIN PROGRAM



8
REV 0

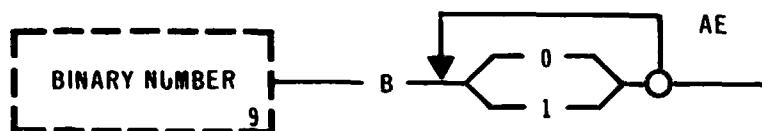
BEGIN SUBROUTINE STATEMENT

BEGIN SUBROUTINE



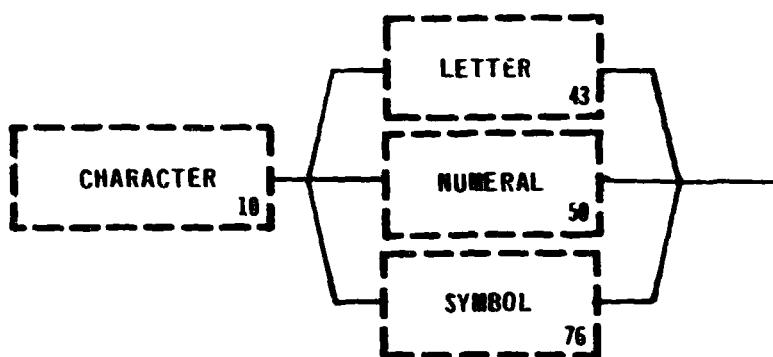
9
REV 0

BINARY NUMBER



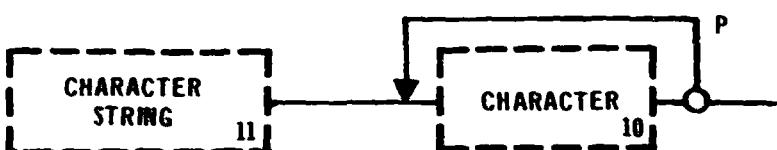
10
REV 0

CHARACTER



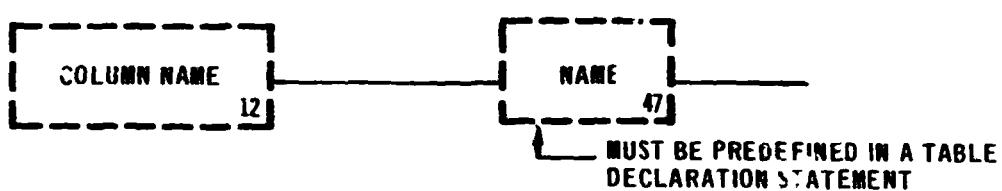
11
REV 0

CHARACTER STRING



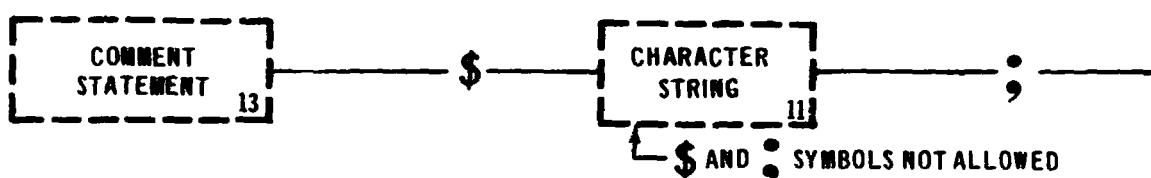
12
REV 0

COLUMN NAME



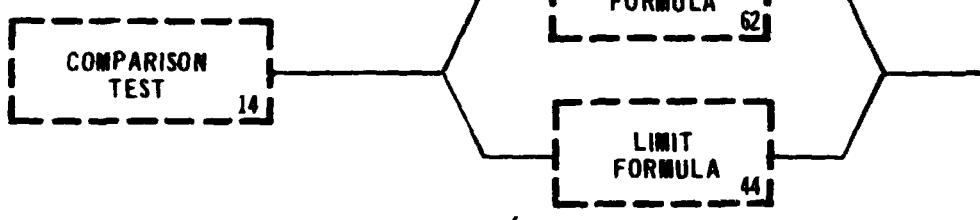
13
REV 1

COMMENT STATEMENT



14
REV 0

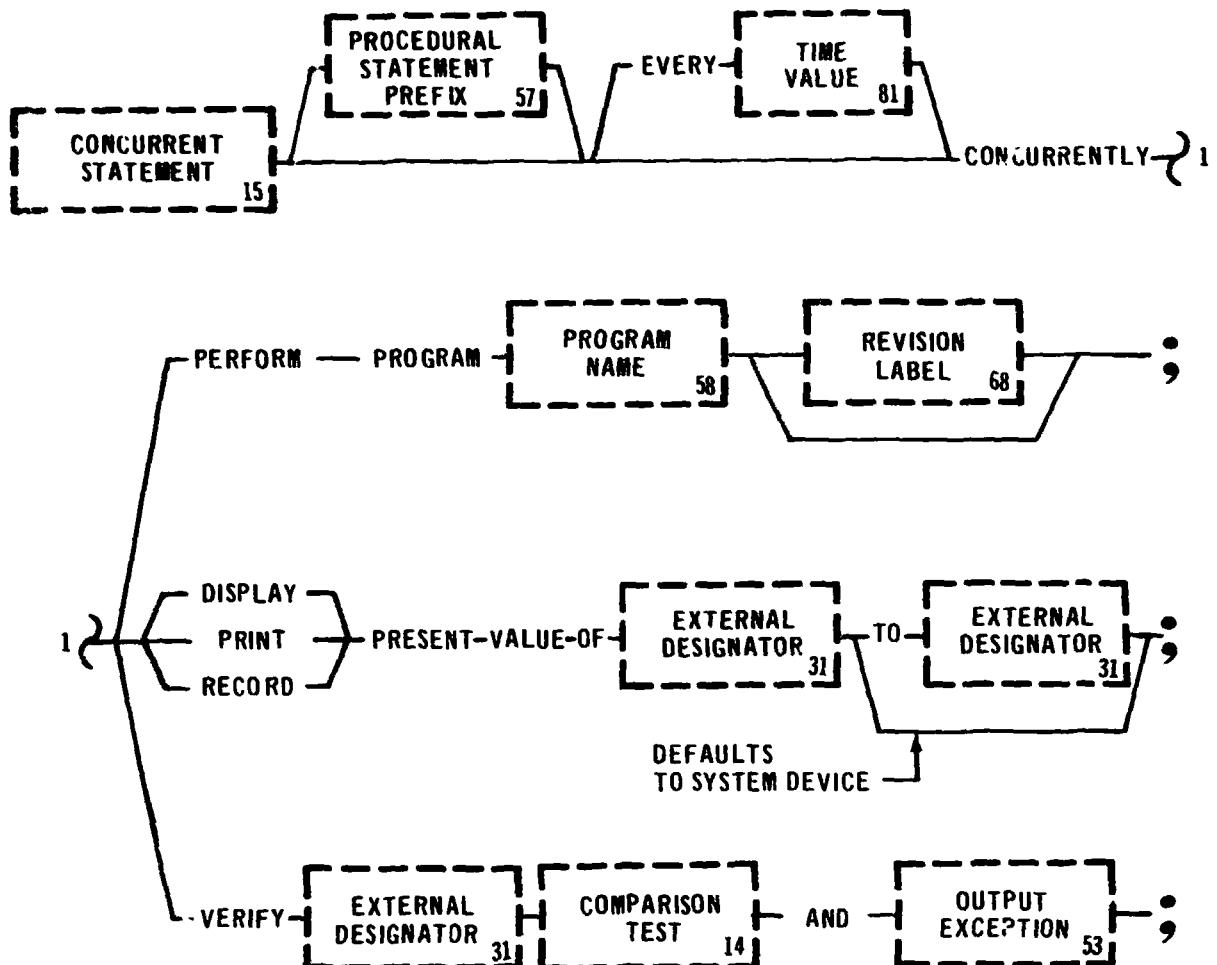
COMPARISON TEST



CONCURRENT

15
REV 1

CONCURRENT STATEMENT



16
REV 0

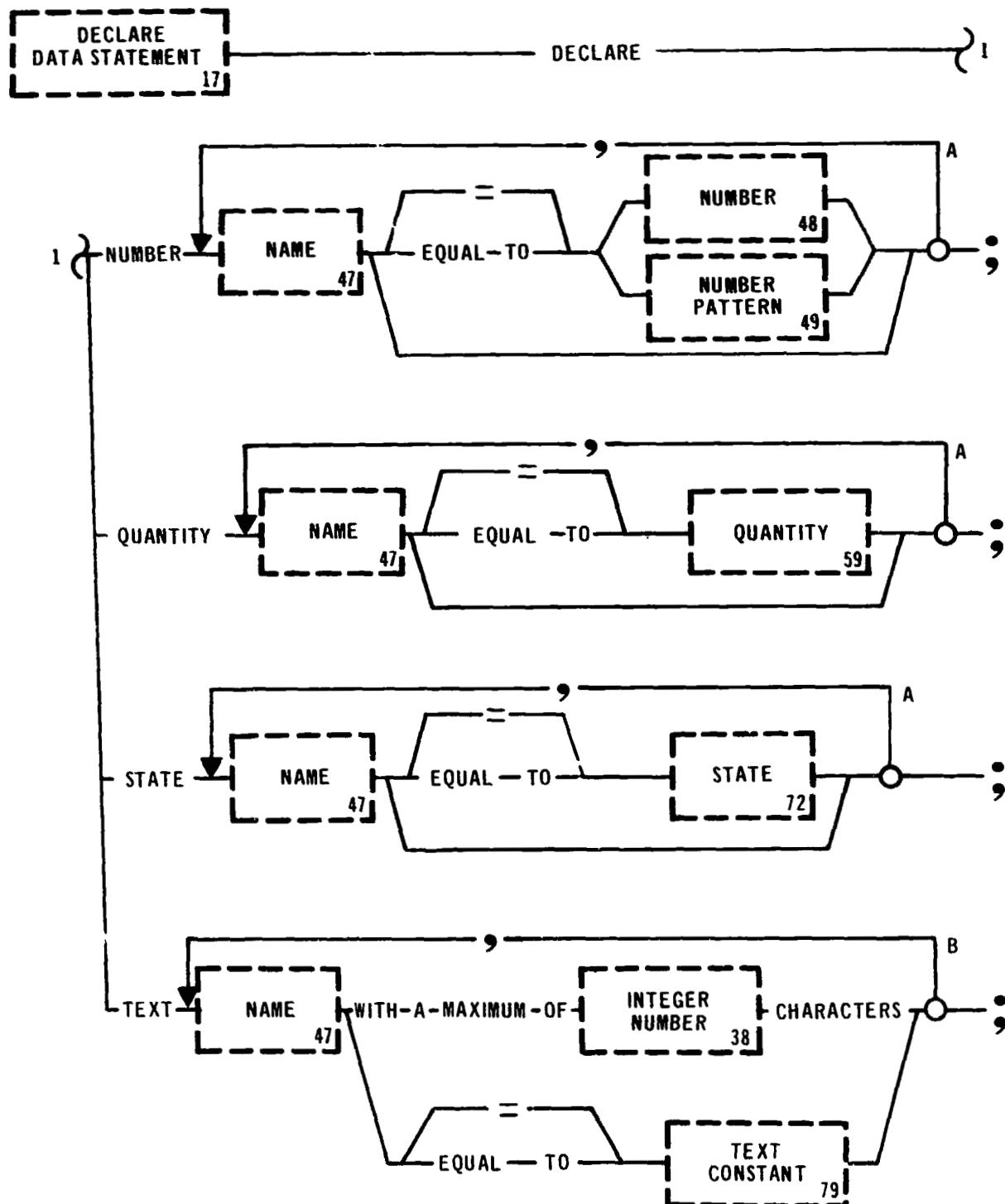
DATA BANK NAME



17
REV 0

DECLARE DATA STATEMENT

DECLARE

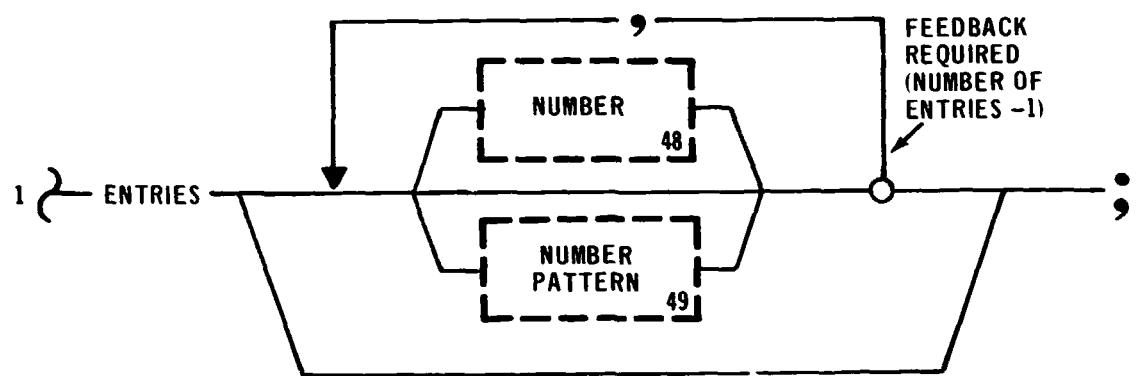


18

REV 0

DECLARE NUMERIC LIST STATEMENT

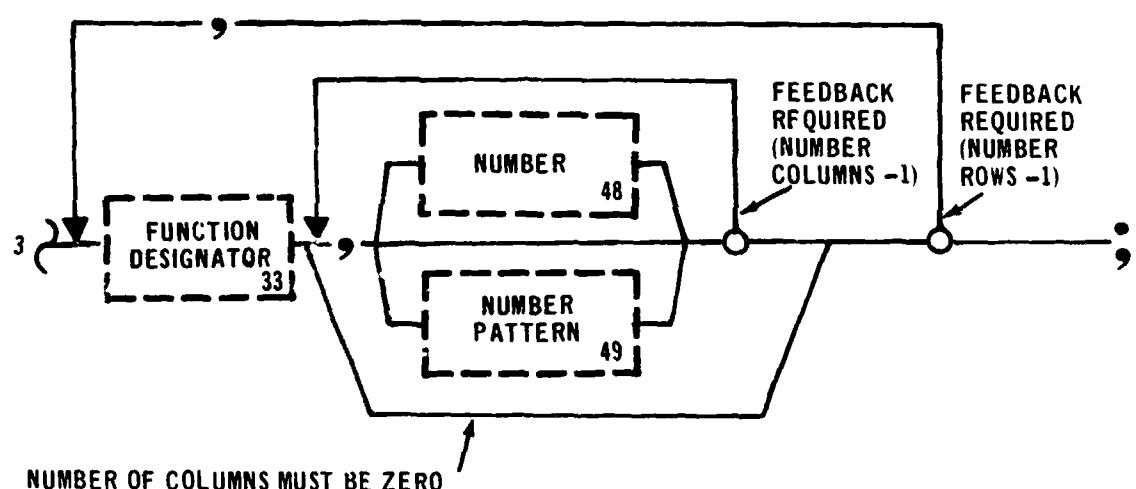
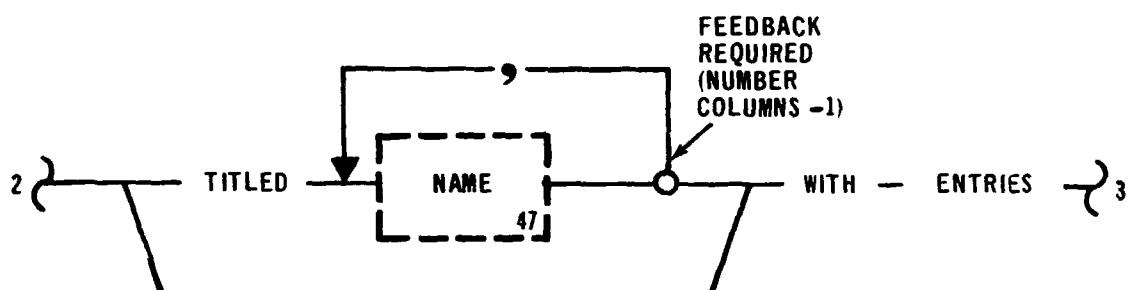
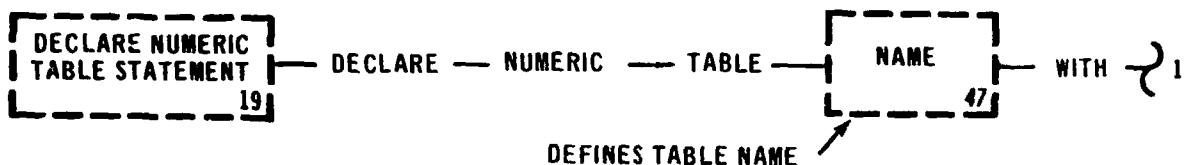
DECLARE NUMERIC LIST



19
REV 0

DECLARE NUMERIC TABLE STATEMENT

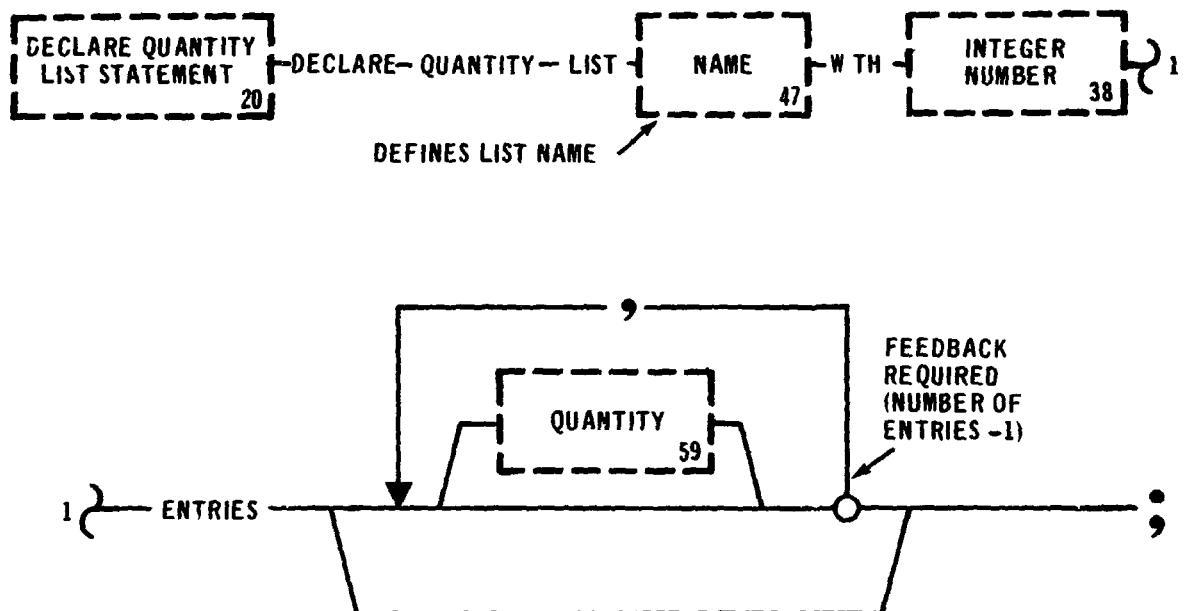
DECLARE NUMERIC TABLE



20
REV 0

DECLARE QUANTITY LIST STATEMENT

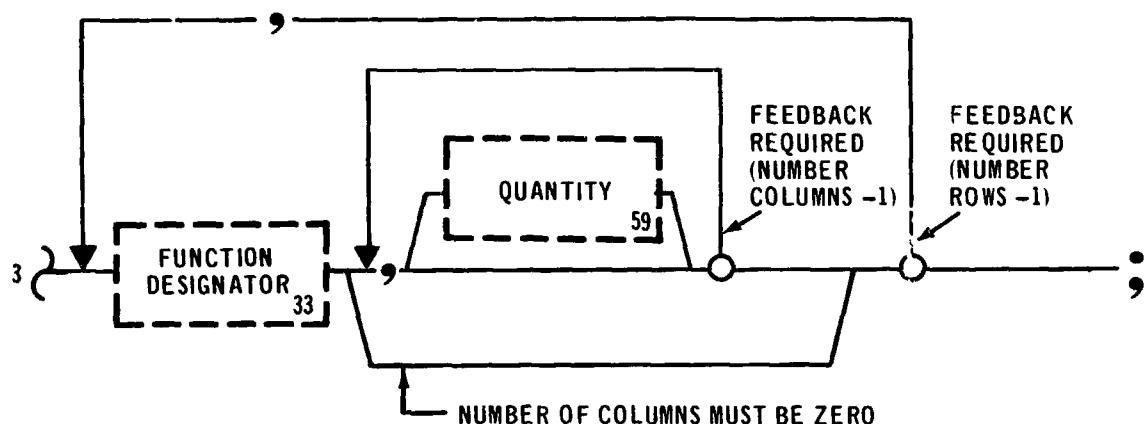
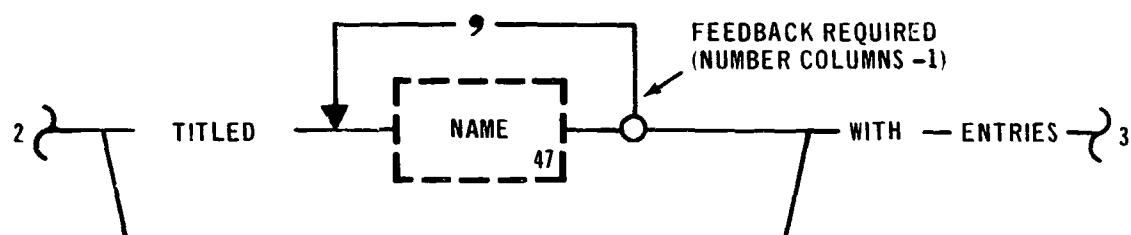
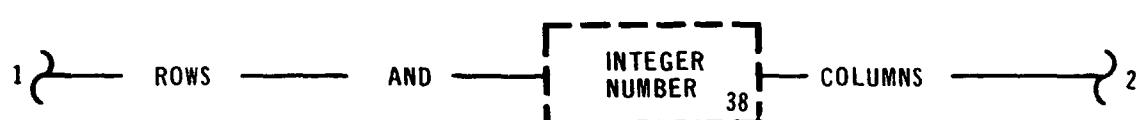
DECLARE QUANTITY LIST



DECLARE QUANTITY TABLE

21
REV 1

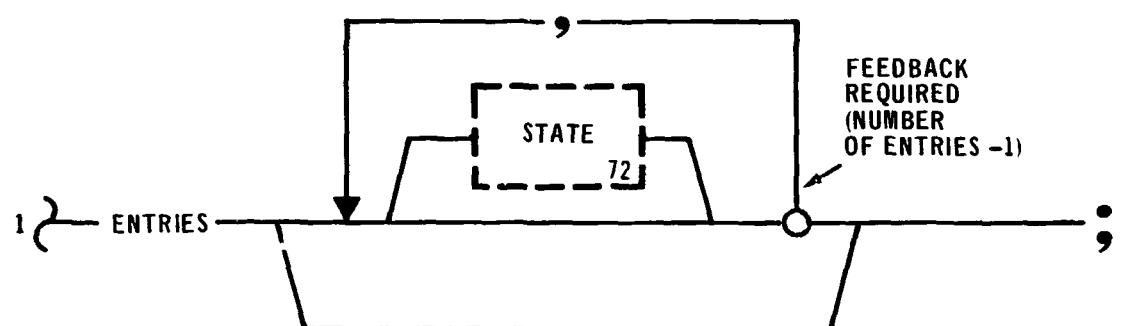
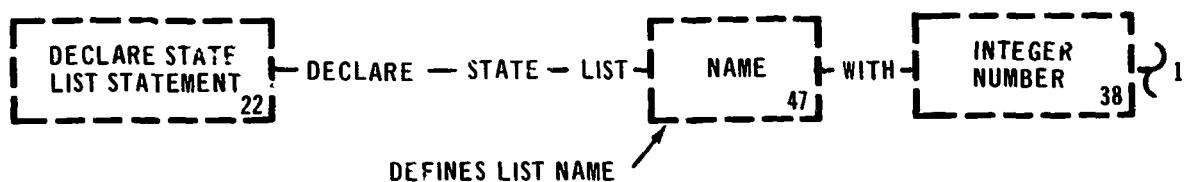
DECLARE QUANTITY TABLE STATEMENT



22
REV 0

DECLARE STATE LIST STATEMENT

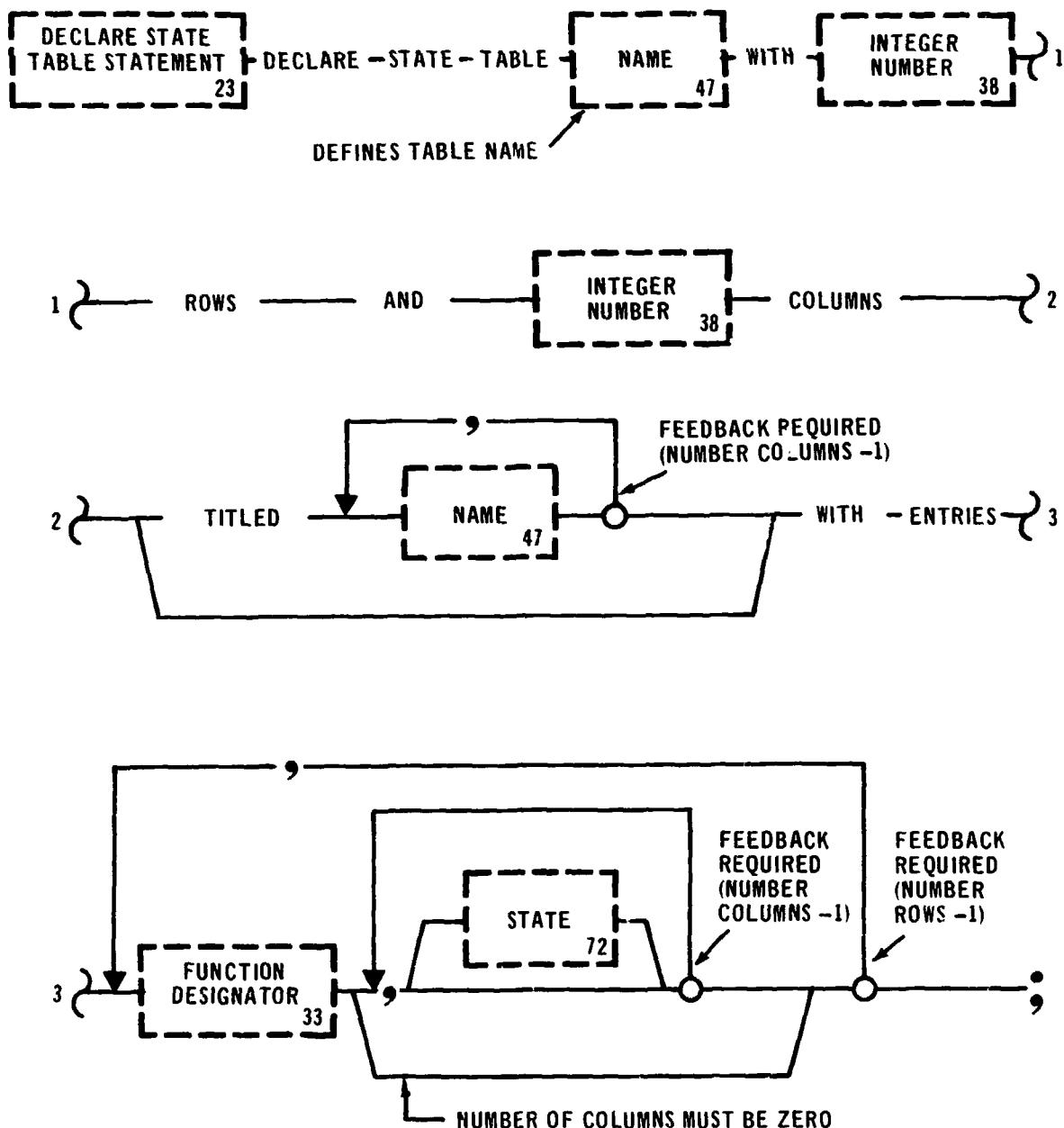
DECLARE STATE LIST



23
REV 0

DECLARE STATE TABLE STATEMENT

DECLARE STATE TABLE

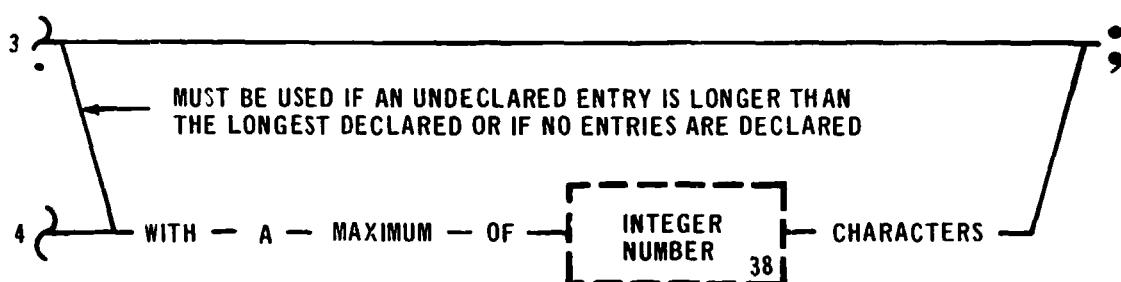
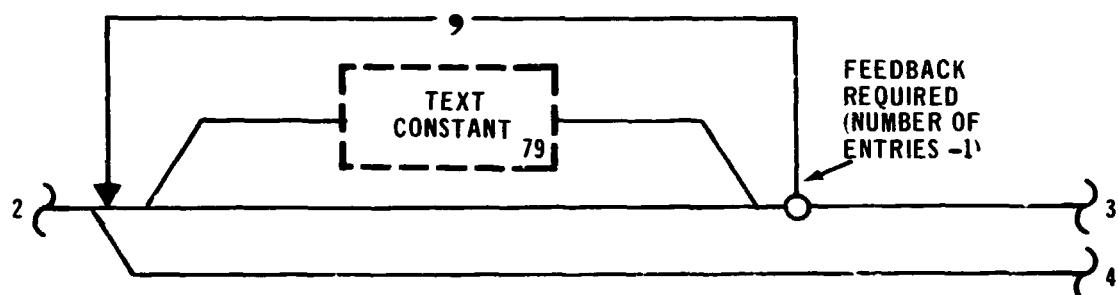
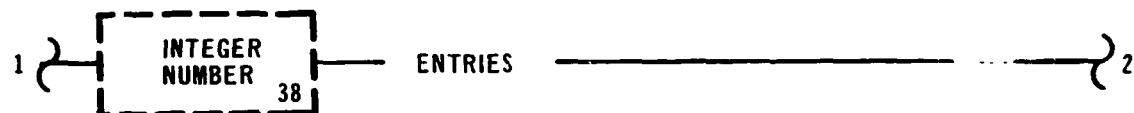
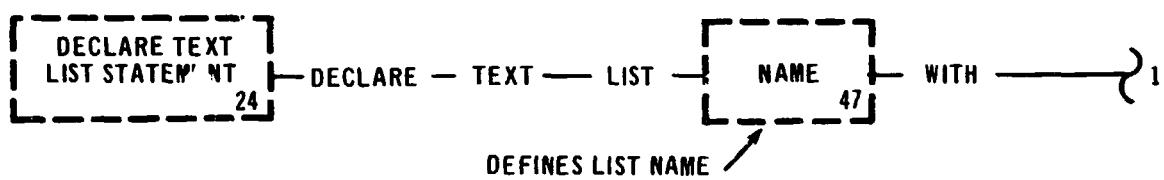


24

REV 1

DECLARE TEXT LIST STATEMENT

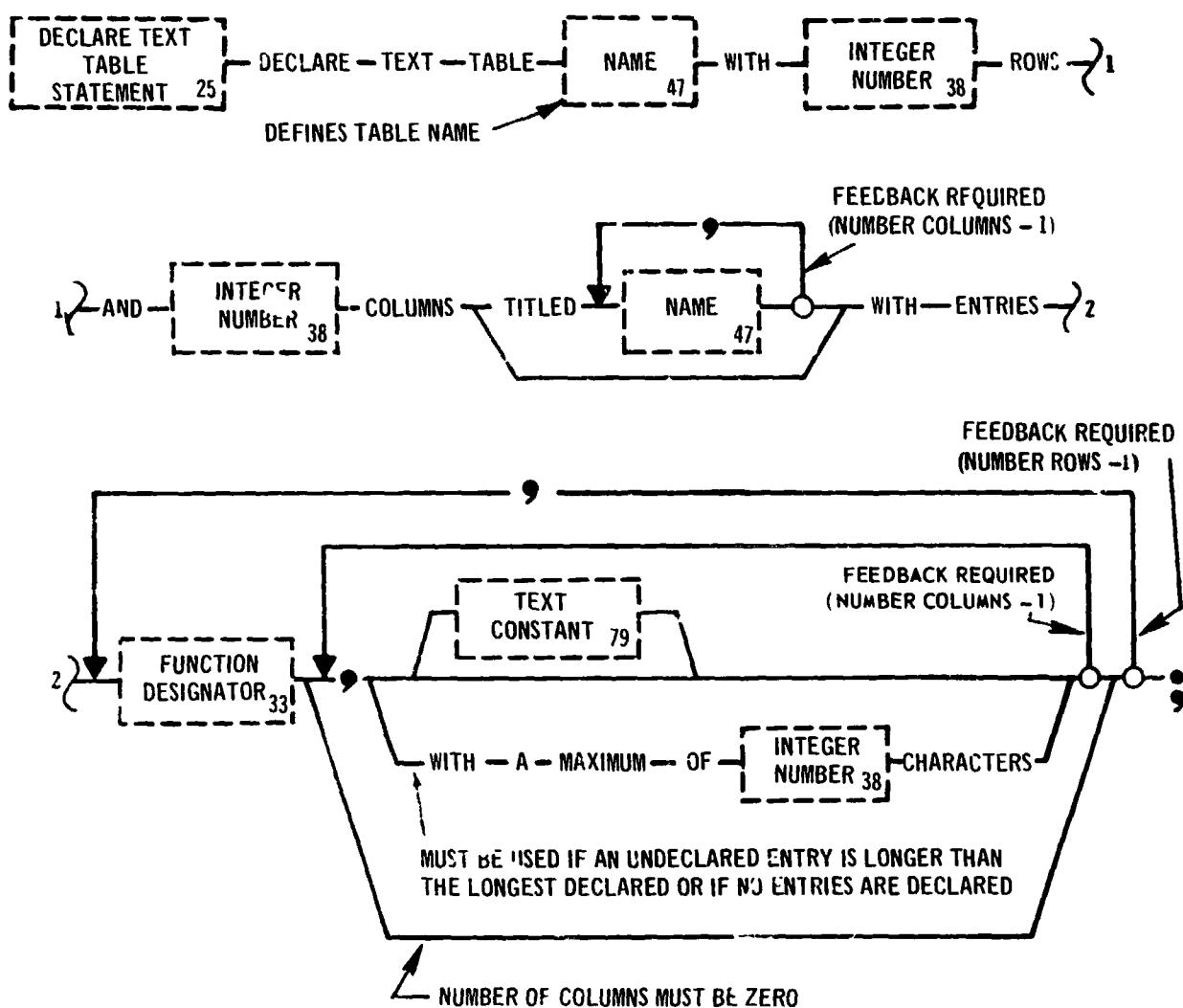
DECLARE TEXT LIST



25
REV 1

DECLARE TEXT TABLE STATEMENT

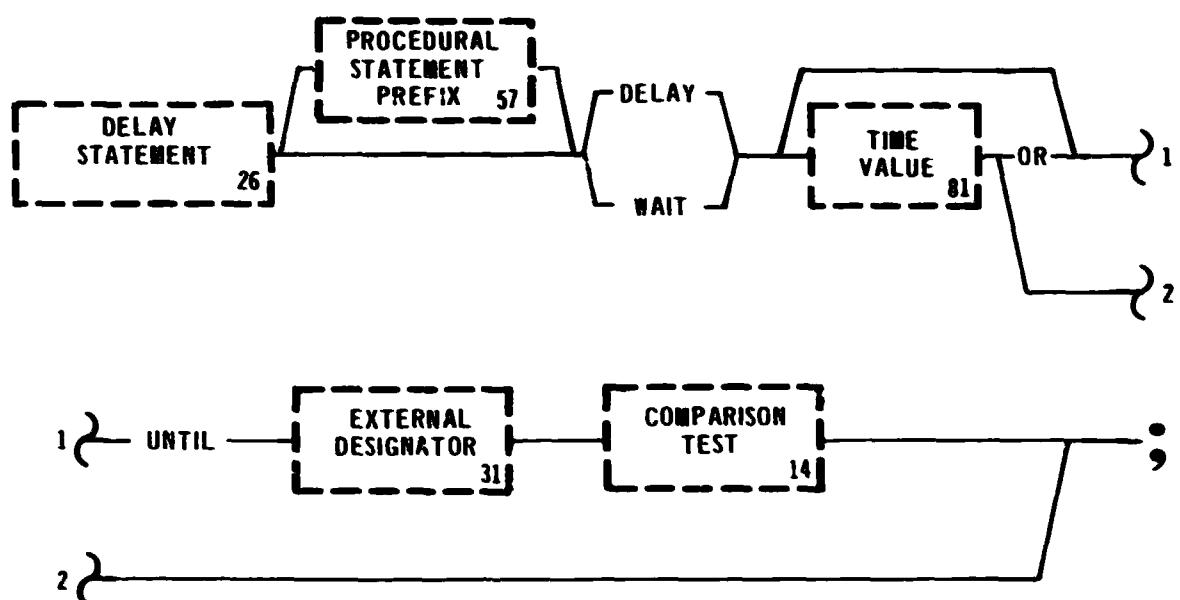
DECLARE TEXT TABLE



26
REV 1

DELAY STATEMENT

DELAY



27
REV 0

DIMENSION

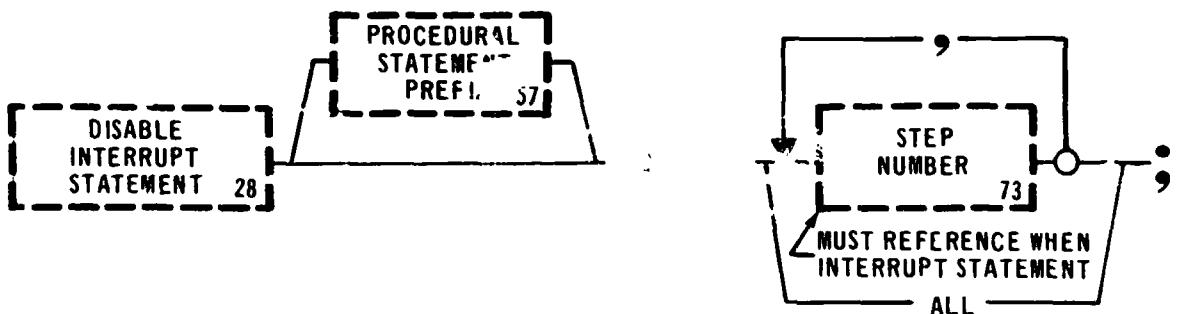


SEE DIMENSION TABLE ON PAGE VI

28
REV 0

DISABLE INTERRUPT STATEMENT

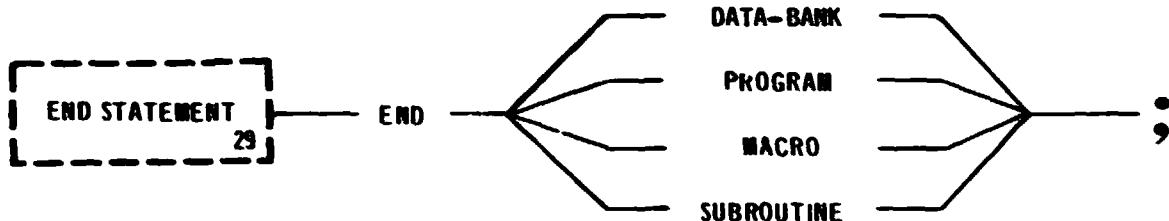
DISABLE



29
REV 0

END STATEMENT

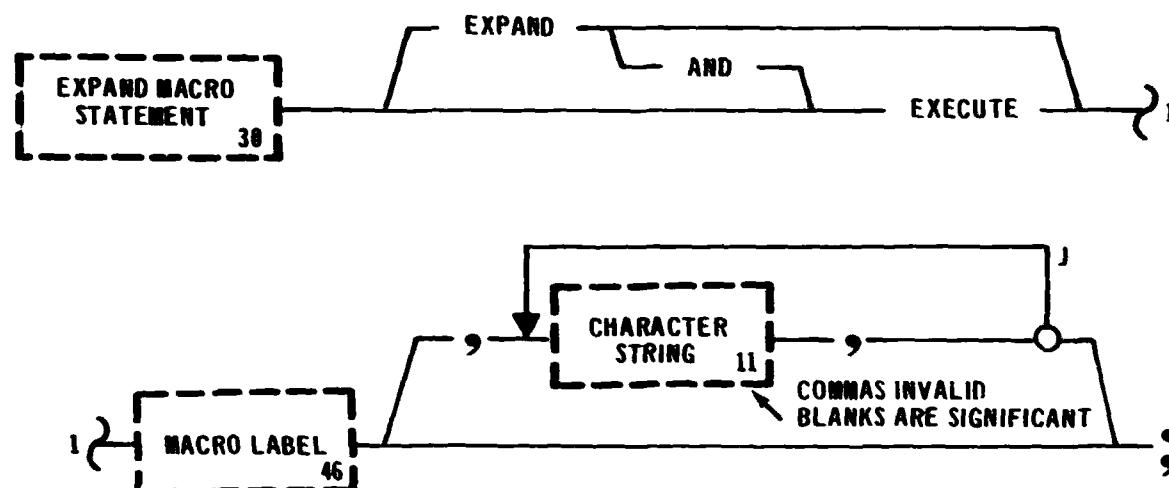
END



30
REV 0

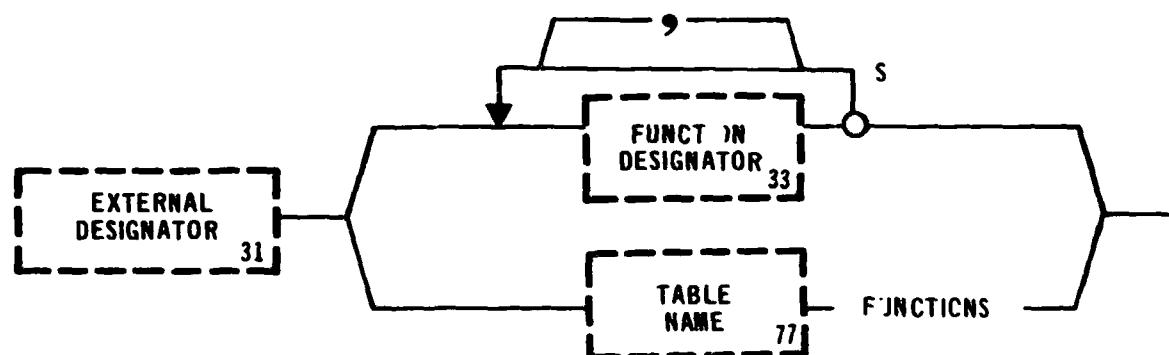
EXPAND MACRO STATEMENT

EXPAND



31
REV 1

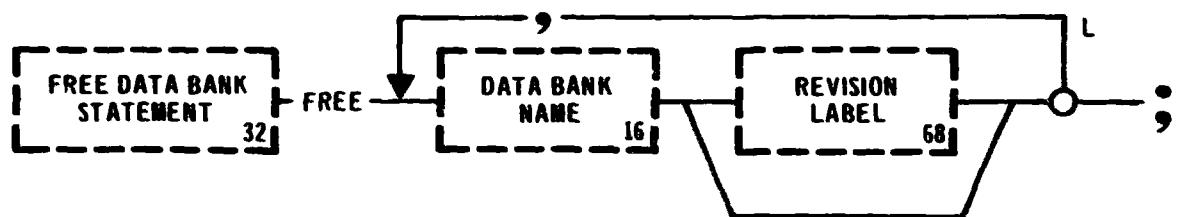
EXTERNAL DESIGNATOR



32
REV 0

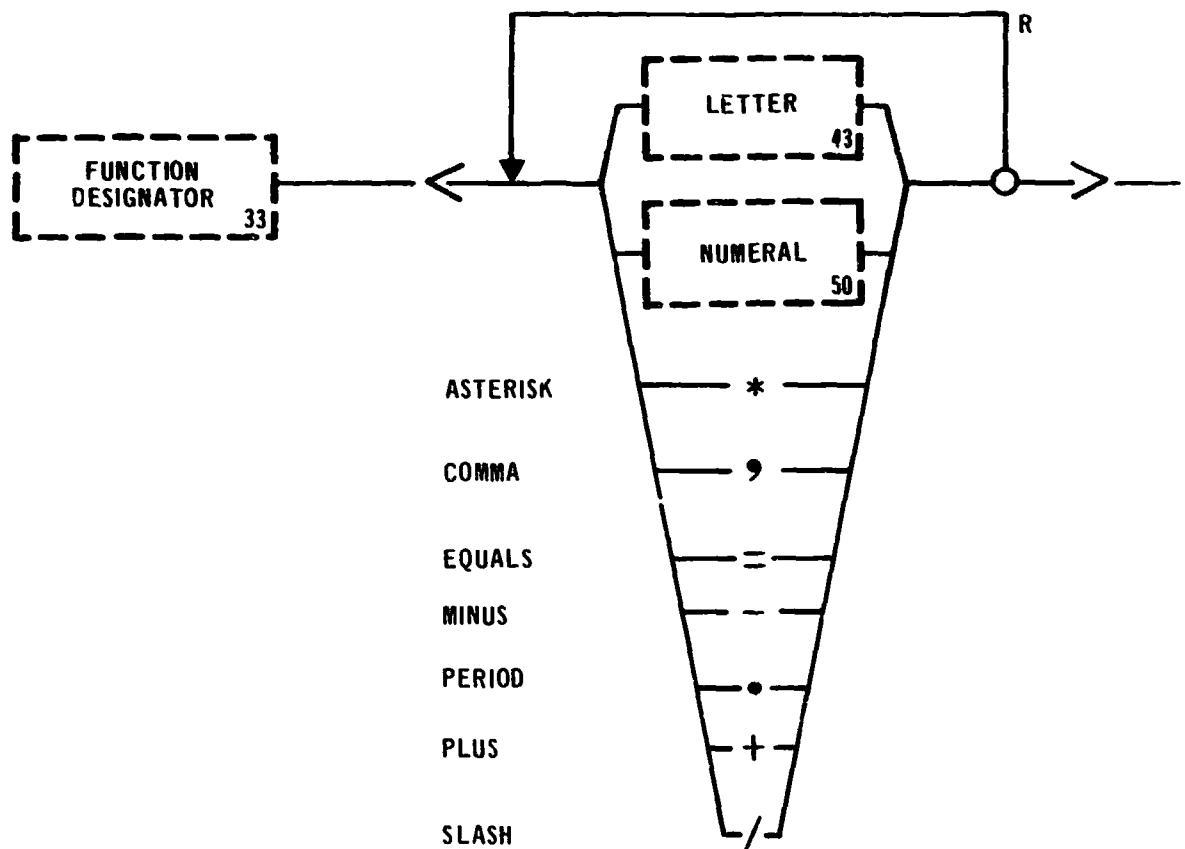
FREE DATA BANK STATEMENT

FREE



33
REV 0

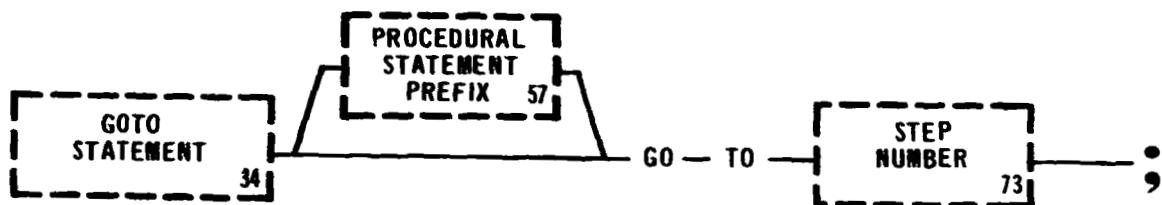
FUNCTION DESIGNATOR



34
REV 0

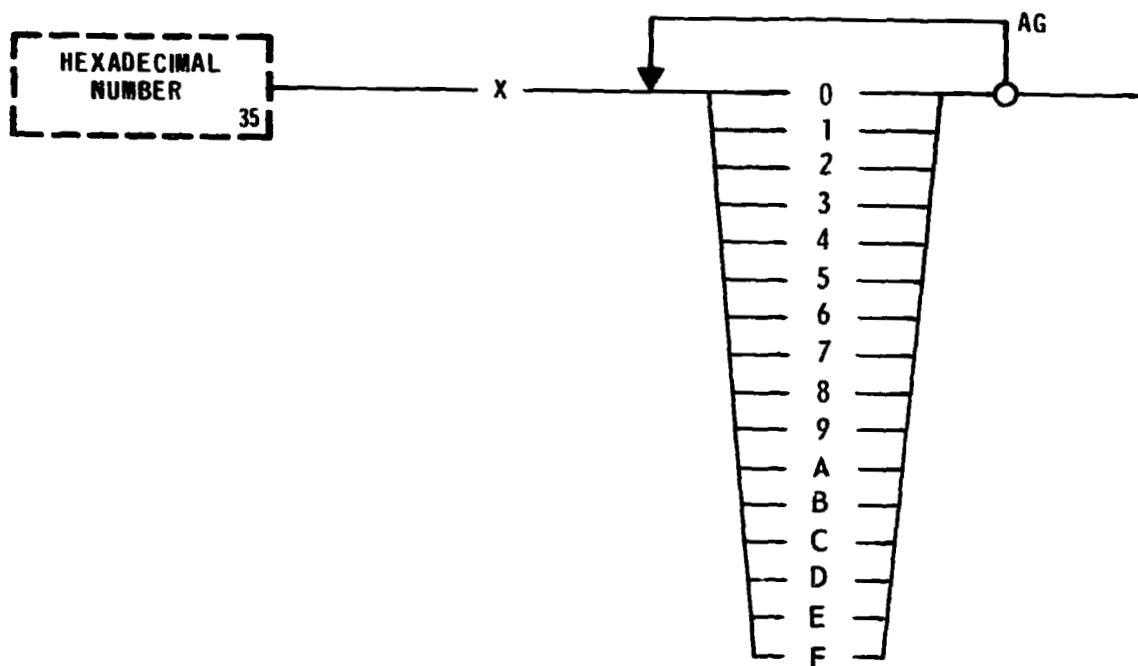
GOTO STATEMENT

GOTO



35
REV 0

HEXADECIMAL NUMBER



36
REV 0

INDEX NAME

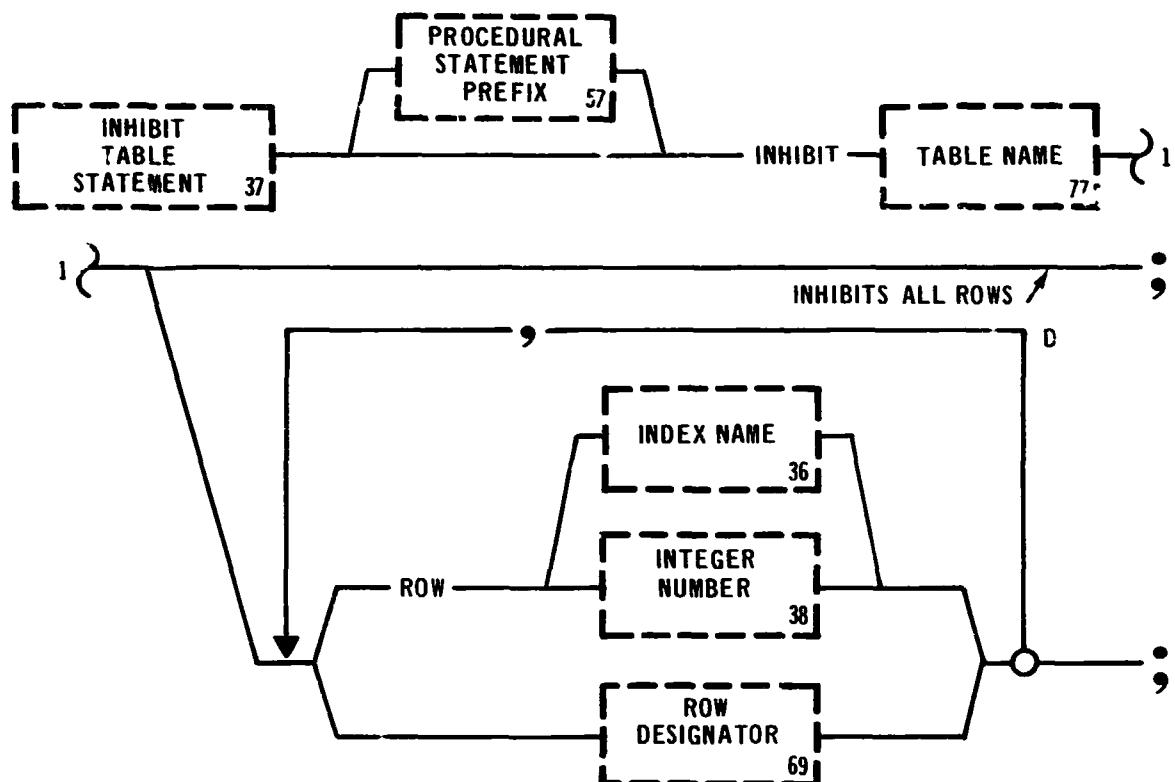


MUST BE A NUMERIC DECLARATION

37
REV 0

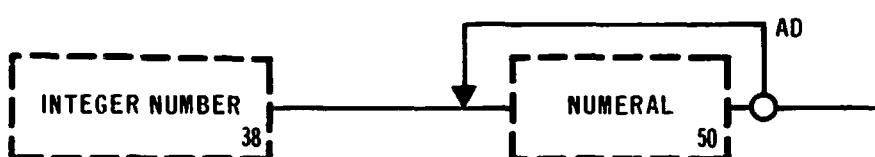
INHIBIT TABLE STATEMENT

INHIBIT



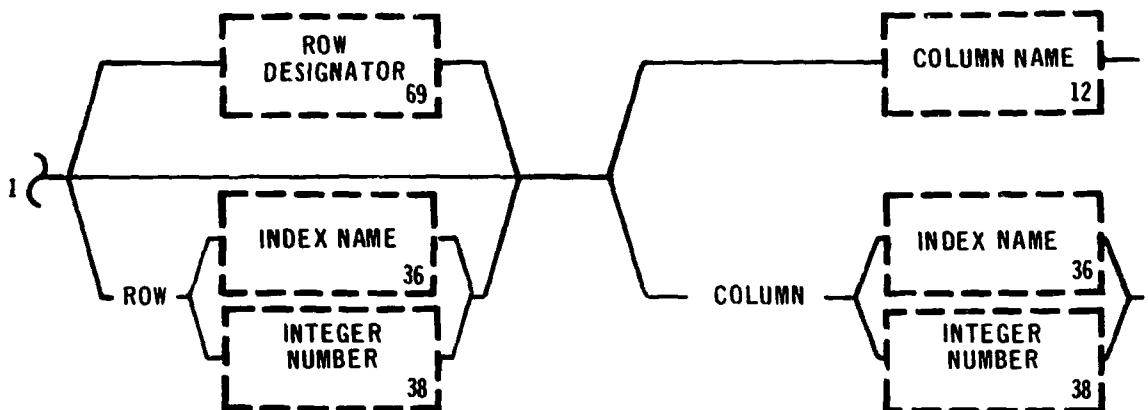
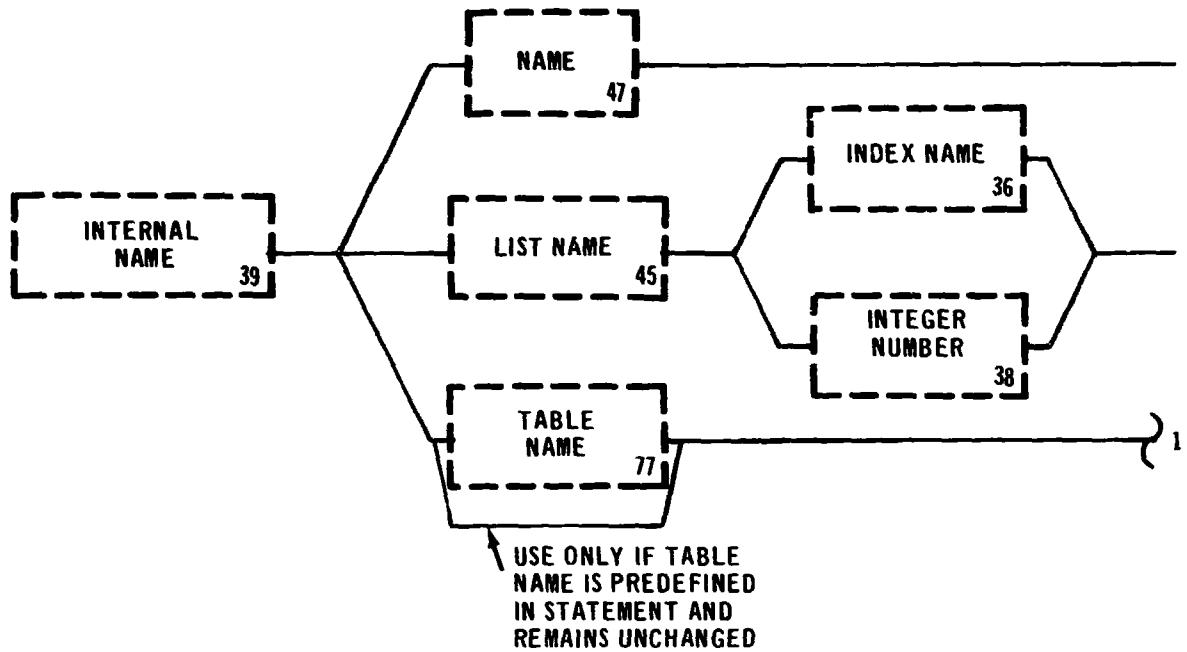
38
REV 0

INTEGER NUMBER



39
REV 1

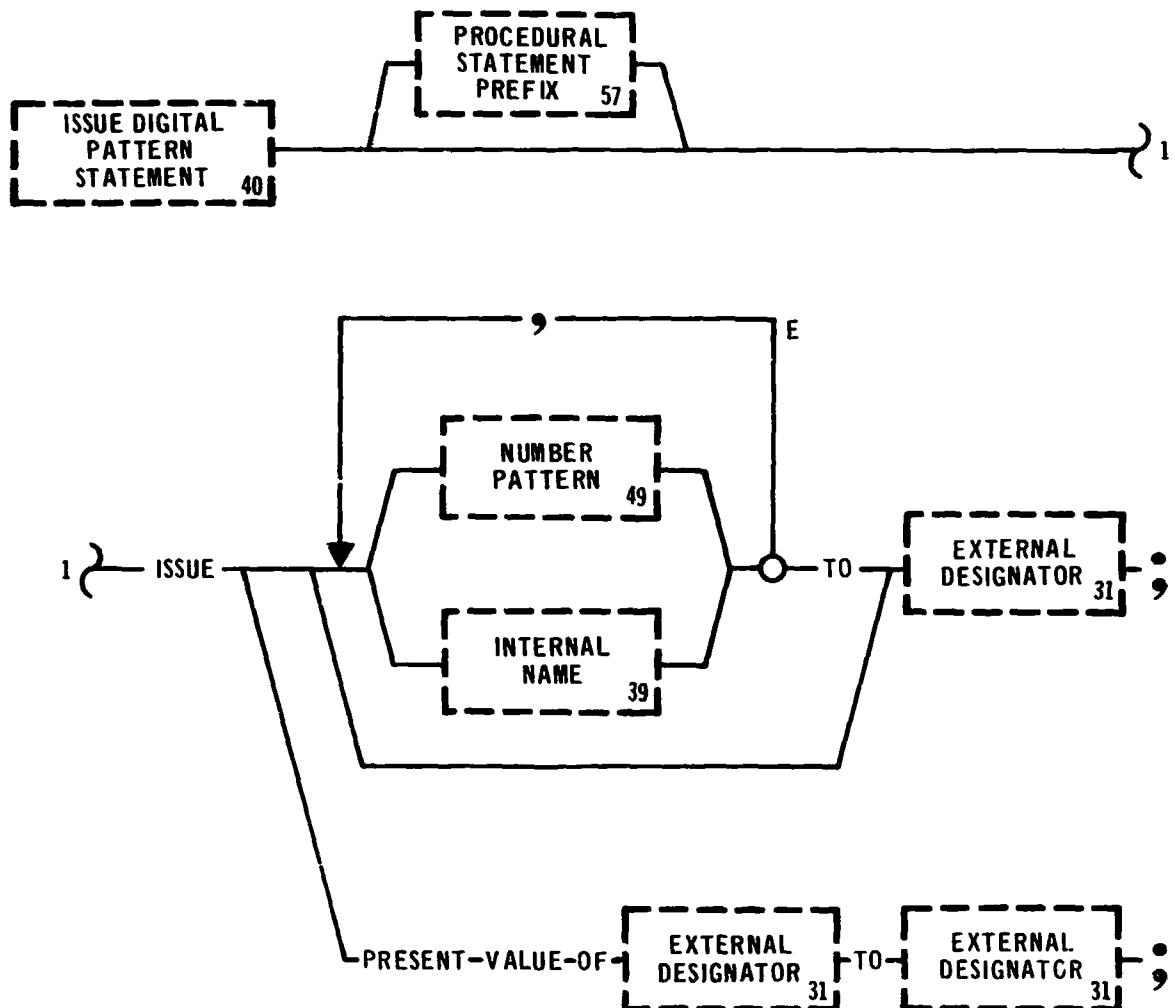
INTERNAL NAME



40
REV 0

ISSUE DIGITAL PATTERN STATEMENT

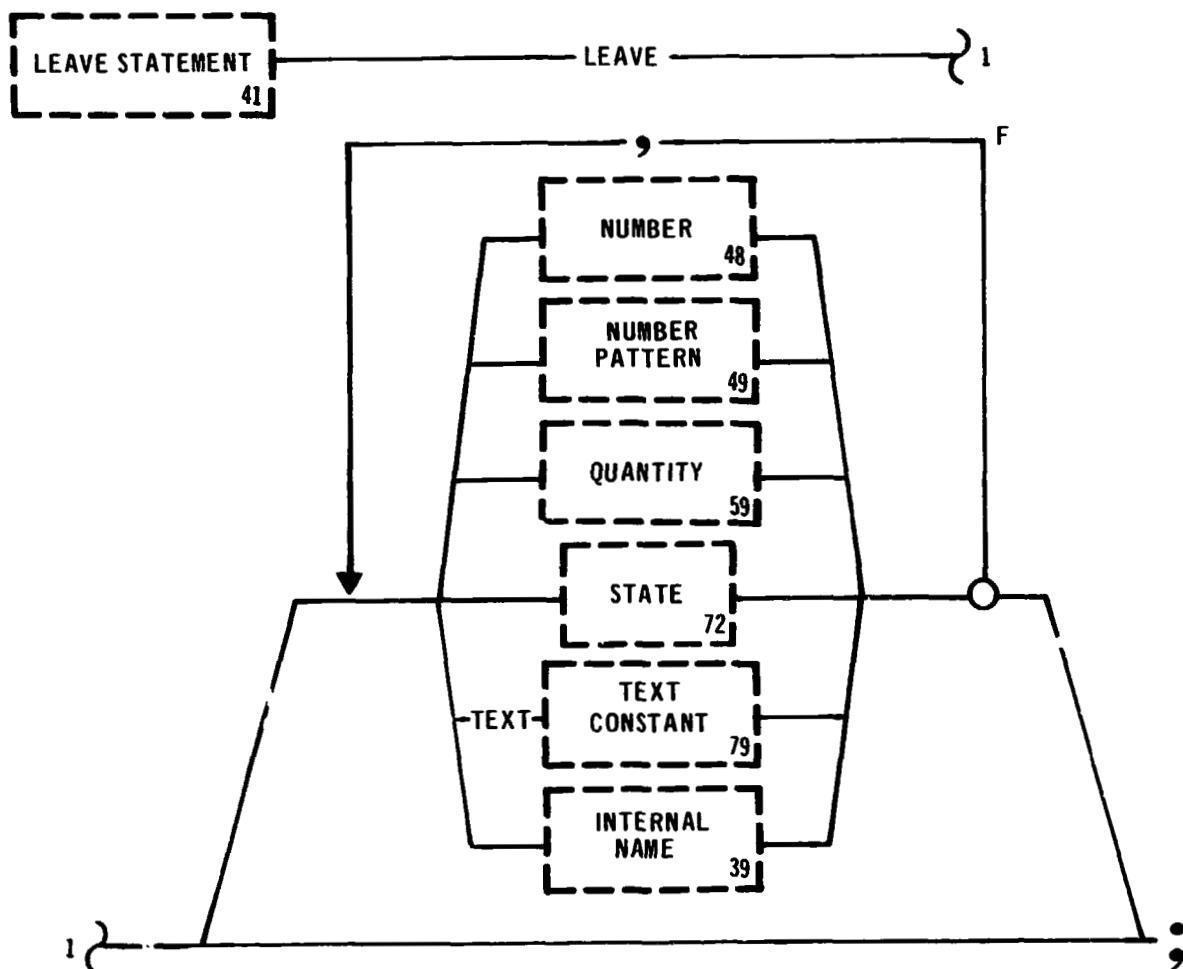
ISSUE



LEAVE

41
REV 1

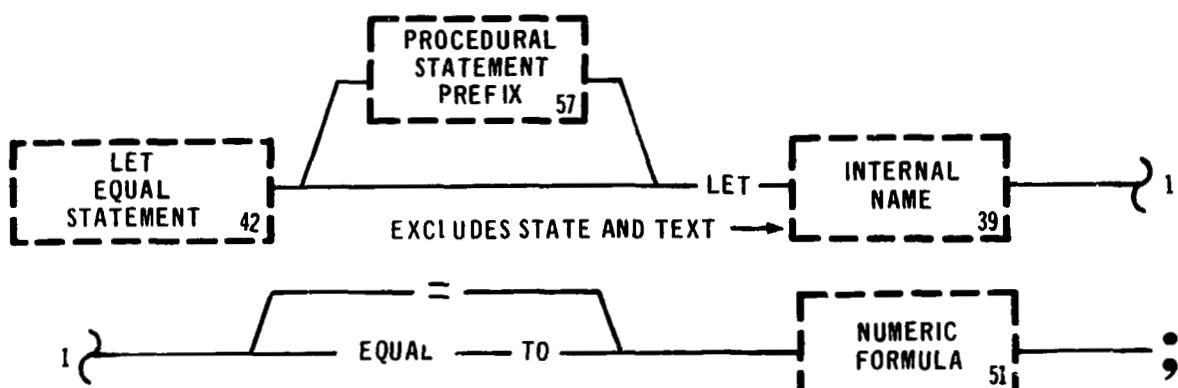
LEAVE STATEMENT



LET

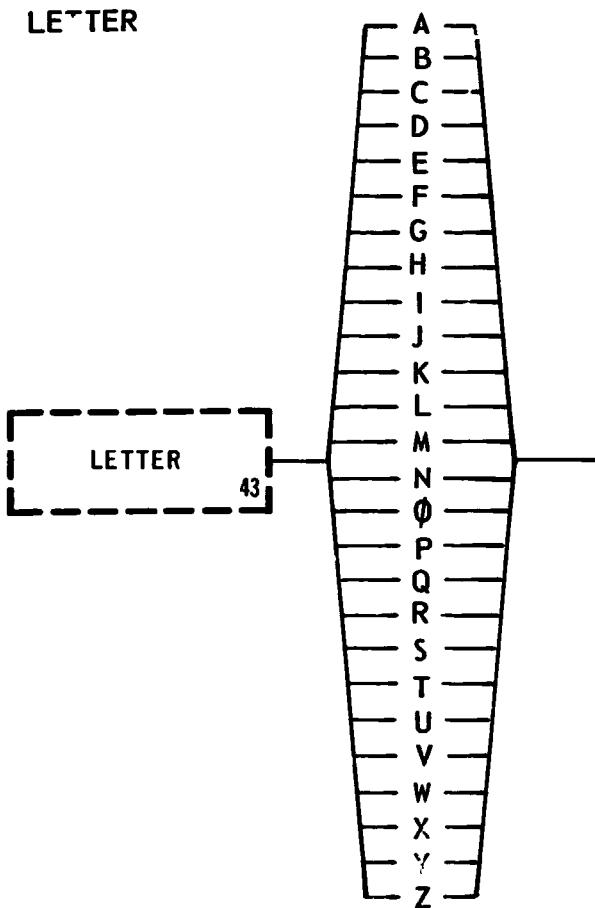
42
REV 0

LET EQUAL STATEMENT



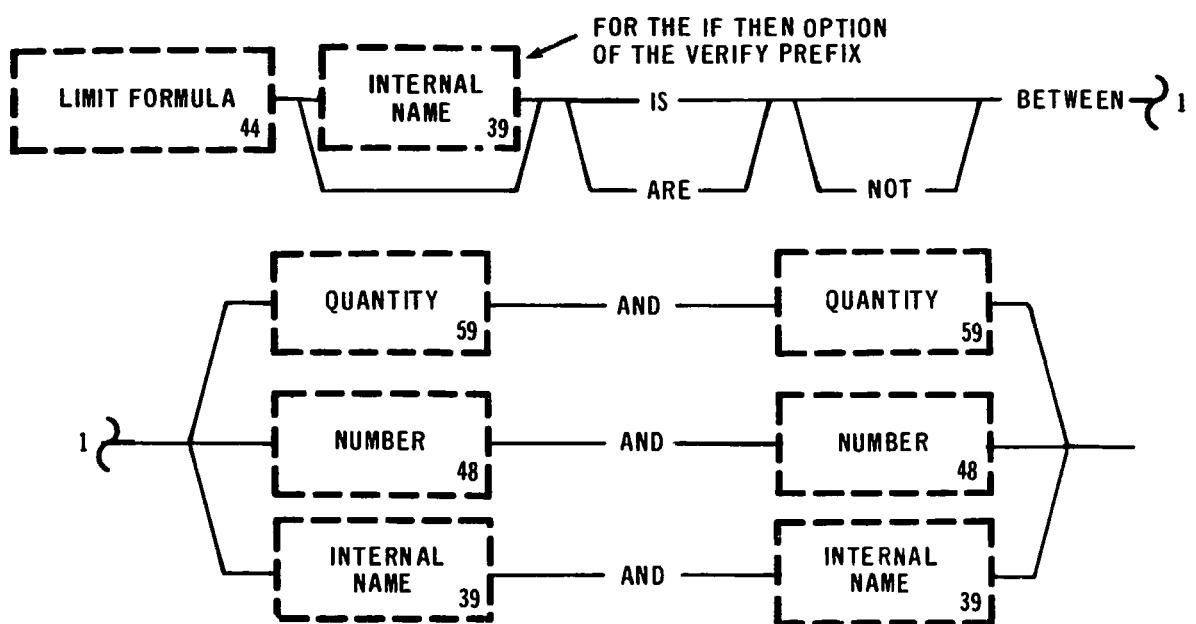
43
REV 0

LETTER



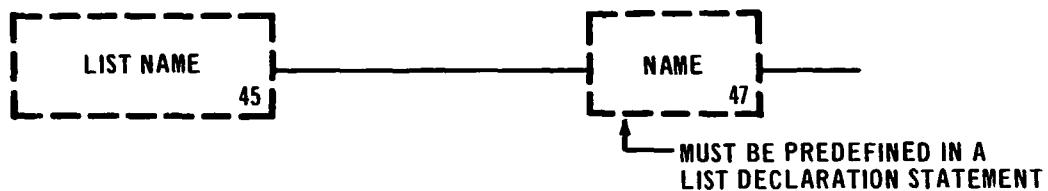
44
REV 0

LIMIT FORMULA



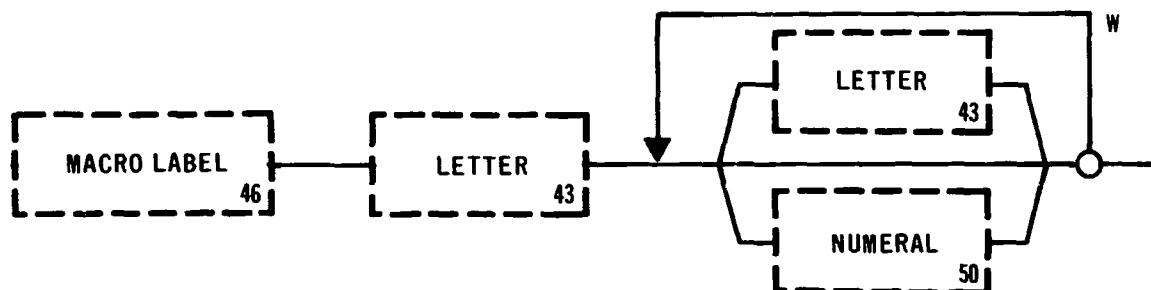
45
REV 0

LIST NAME



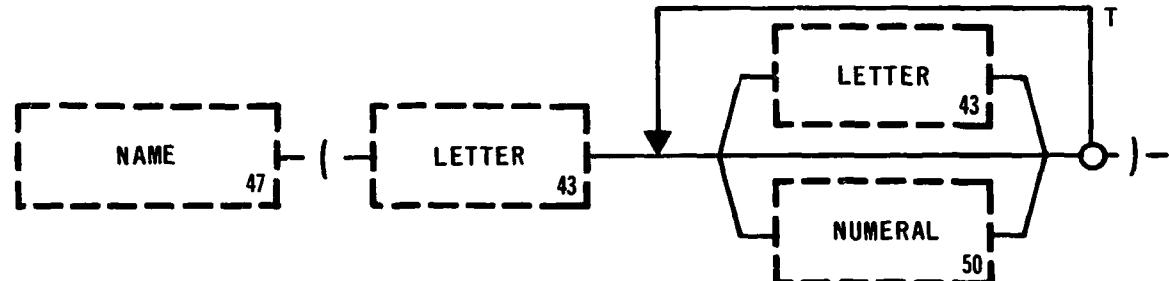
46
REV 0

MACRO LABEL



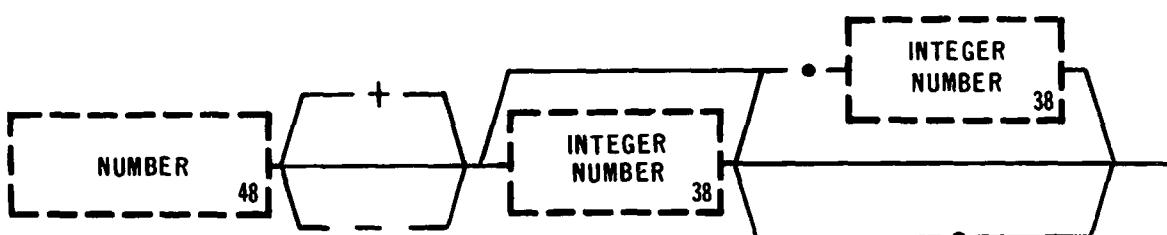
47
REV 0

NAME



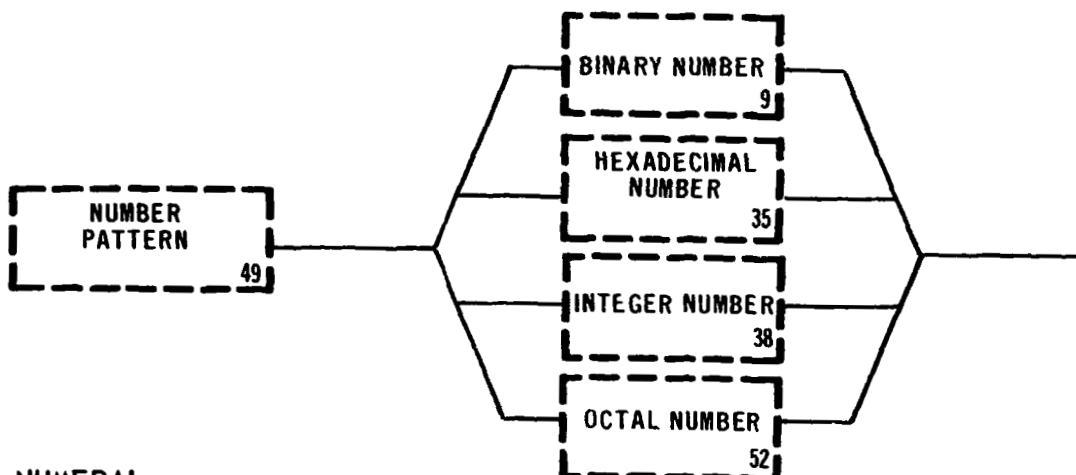
48
REV 1

NUMBER



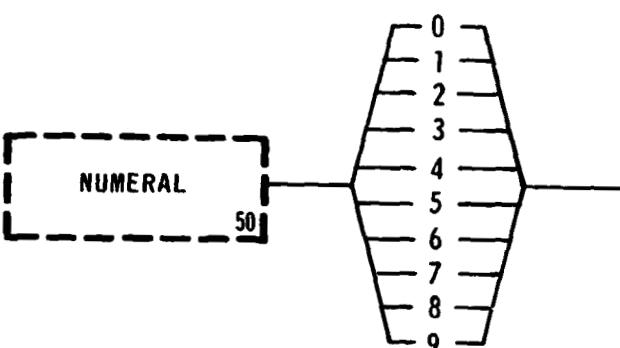
49
REV 0

NUMBER PATTERN



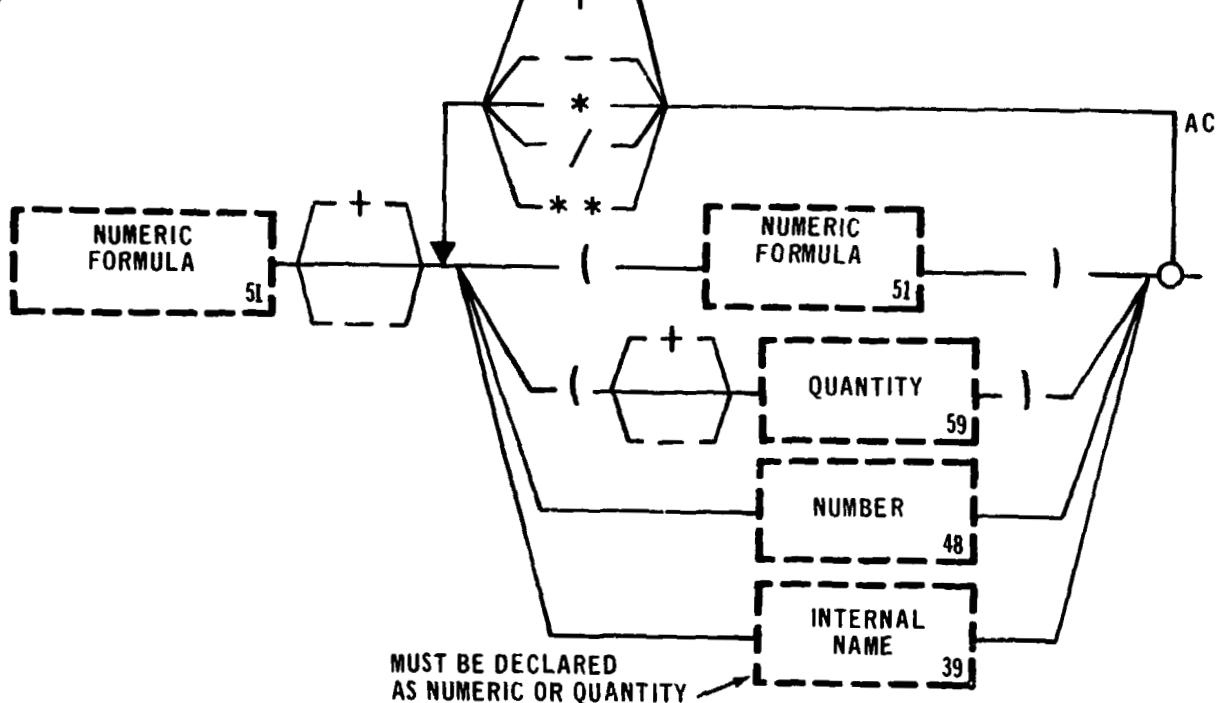
50
REV 0

NUMERAL



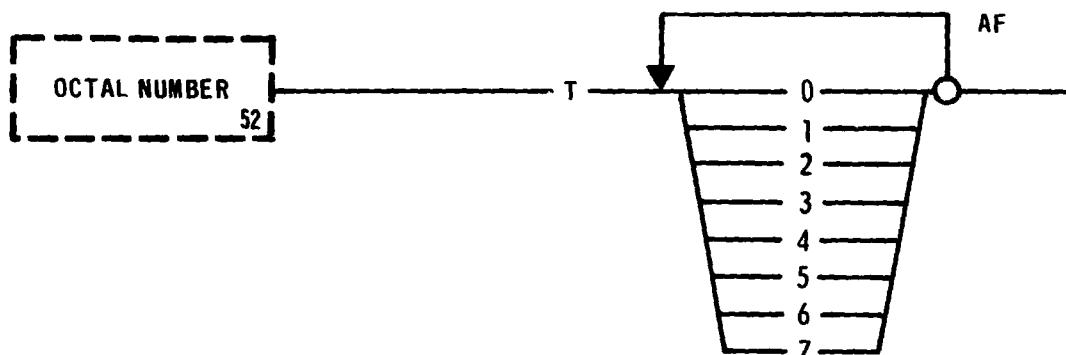
51
REV 0

NUMERIC FORMULA



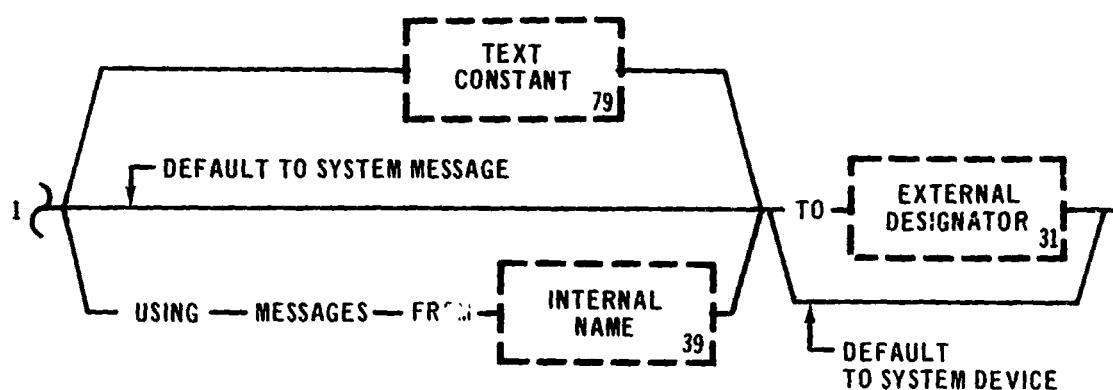
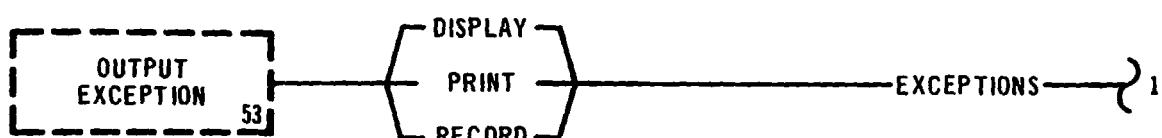
52
REV 1

OCTAL NUMBER



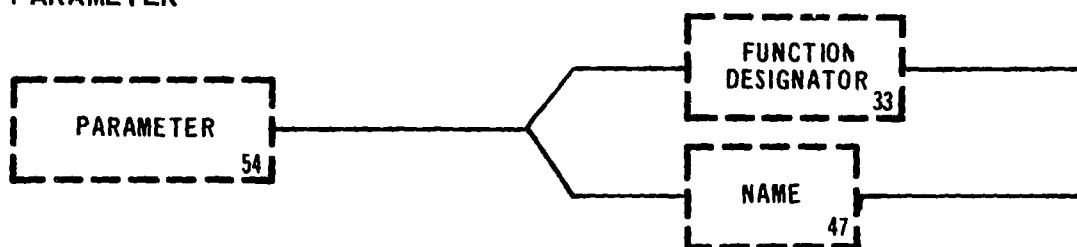
53
REV 1

OUTPUT EXCEPTION



54
REV 1

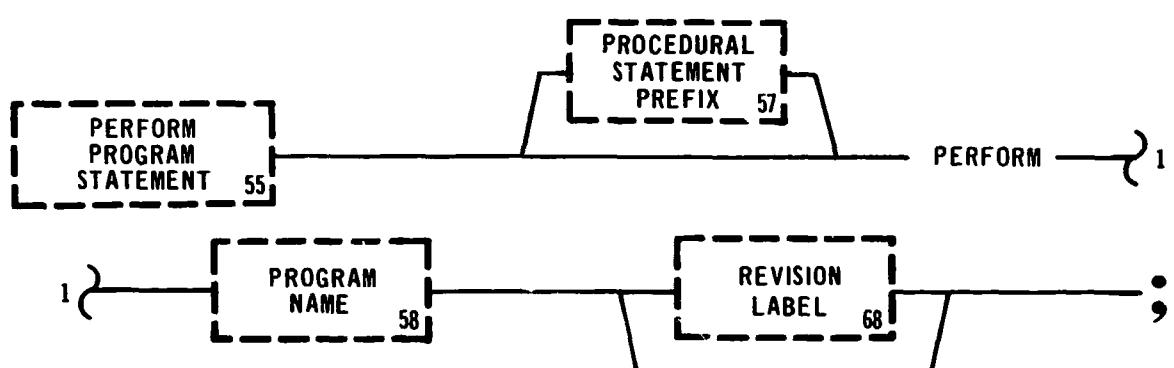
PARAMETER



55
REV 0

PERFORM PROGRAM STATEMENT

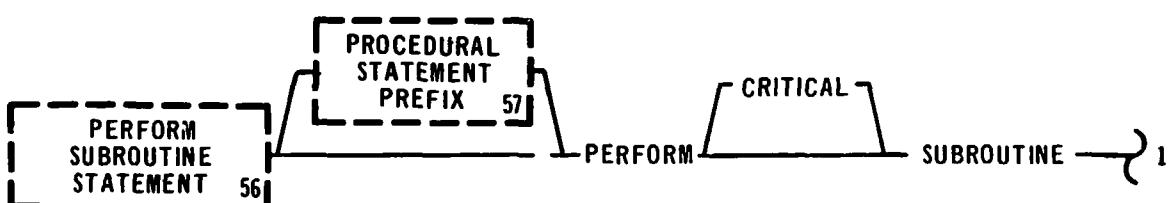
PERFORM



56
REV 0

PERFORM SUBROUTINE STATEMENT

PERFORM SUBROUTINE

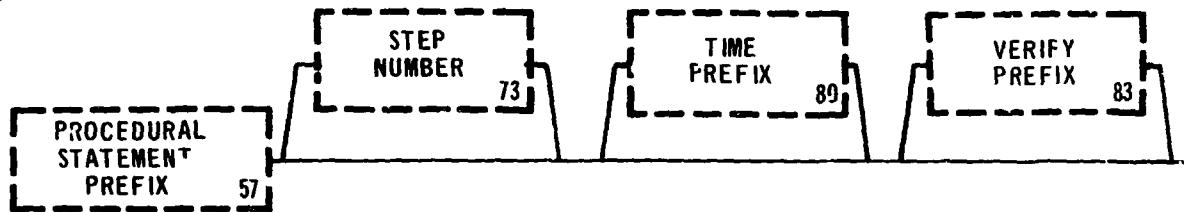


1
SUBROUTINE
NAME
75

29

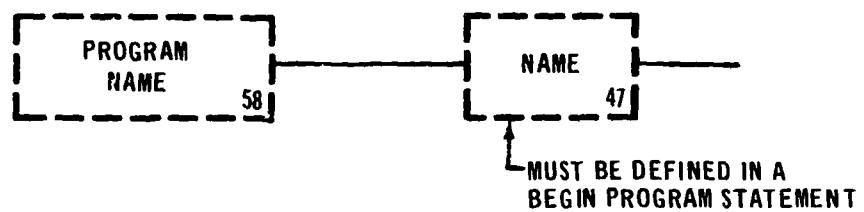
57
REV 1

PROCEDURAL STATEMENT PREFIX



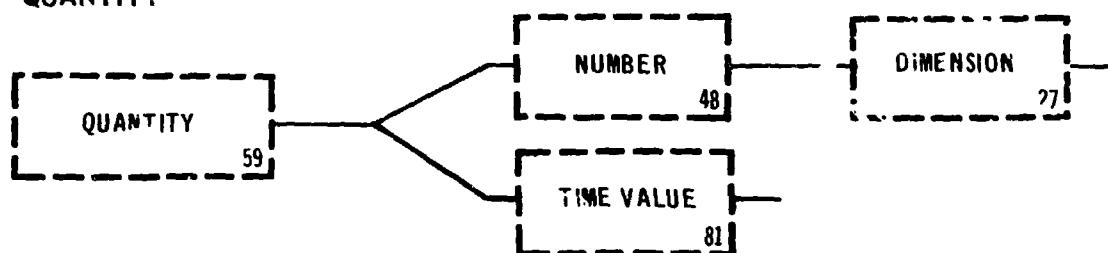
58
REV 0

PROGRAM NAME



59
REV 0

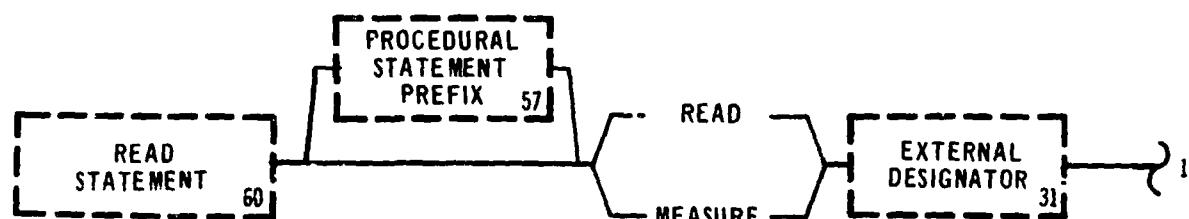
QUANTITY



60
REV 0

READ STATEMENT

READ

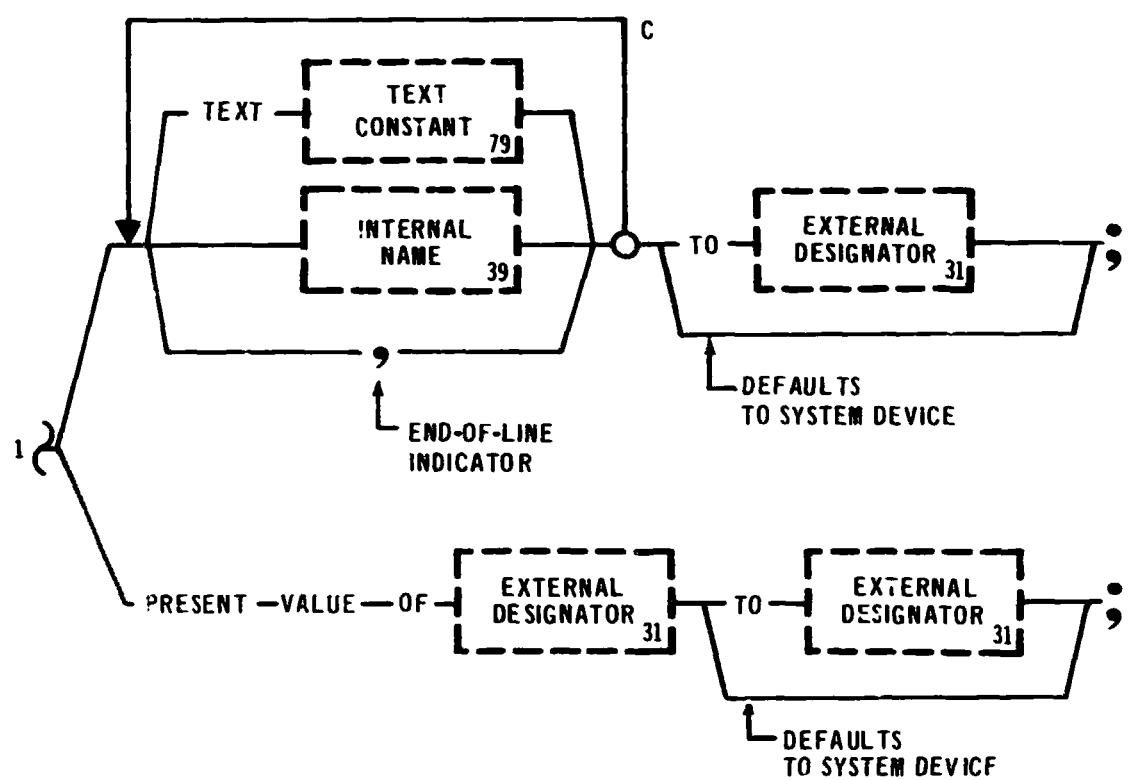
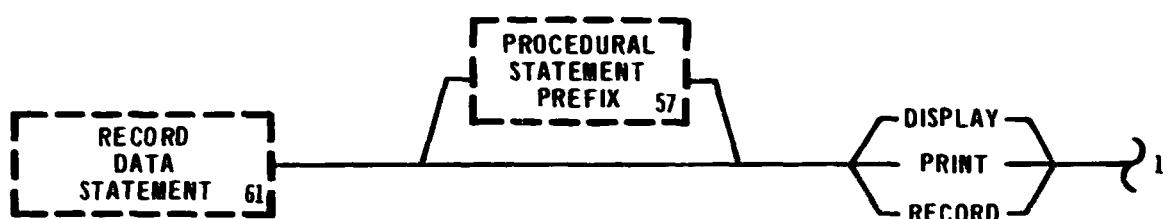


1 AND SAVE AS INTERNAL NAME 39 ;

61
REV 0

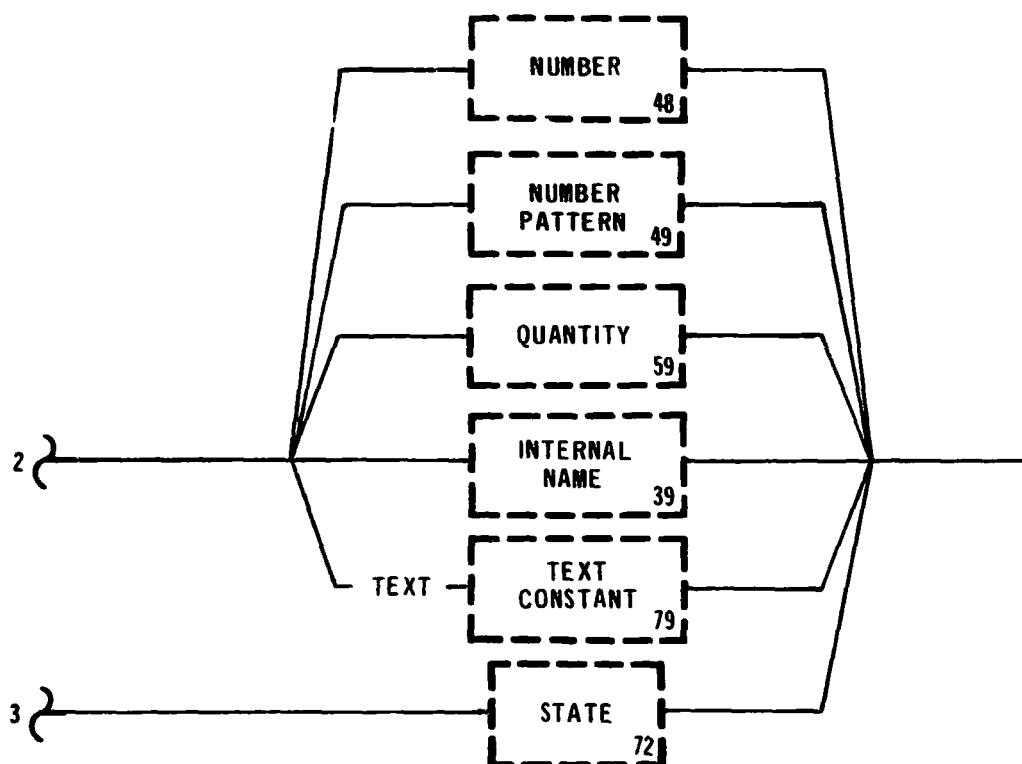
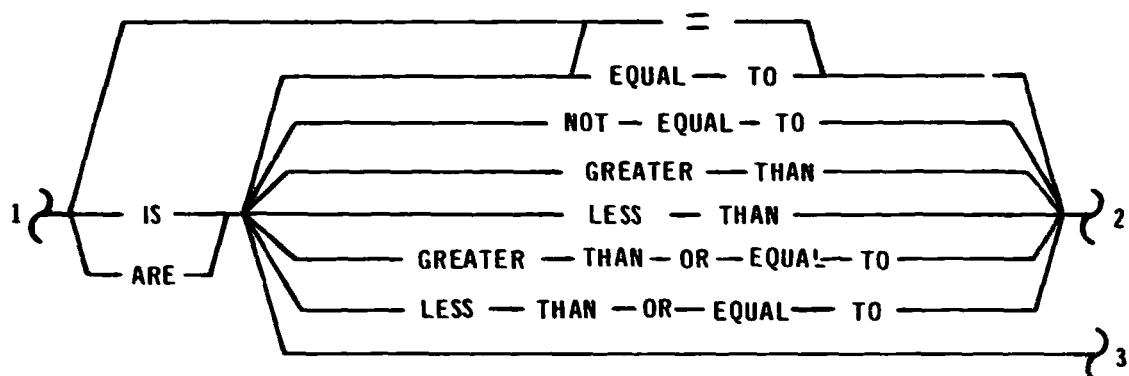
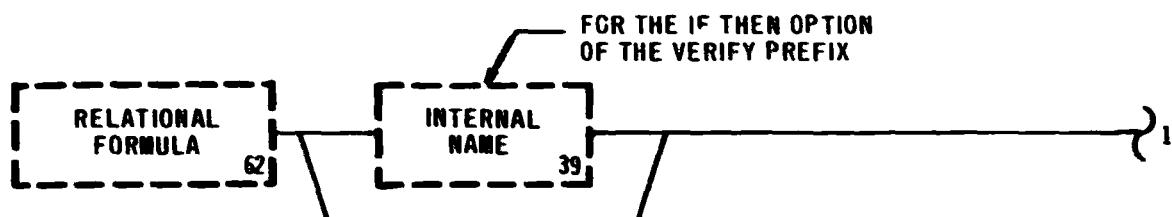
RECORD DATA STATEMENT

RECORD



62
REV 0

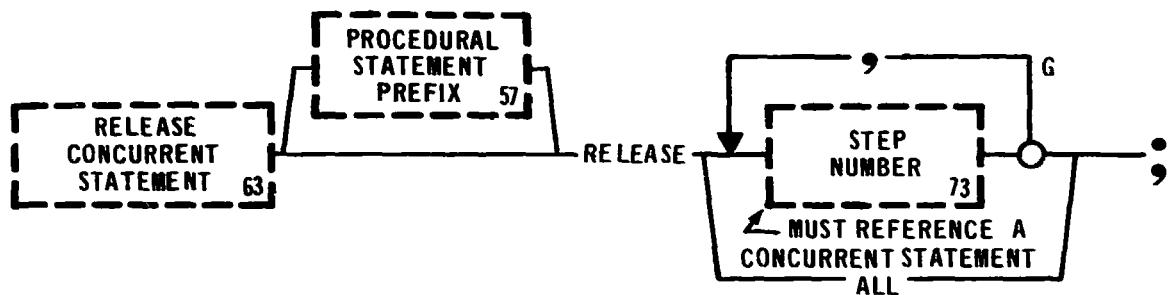
RELATIONAL FORMULA



63
REV 0

RELEASE CONCURRENT STATEMENT

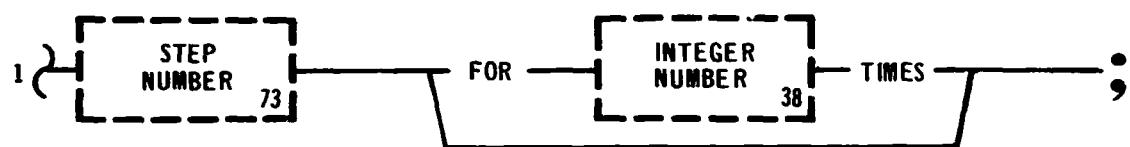
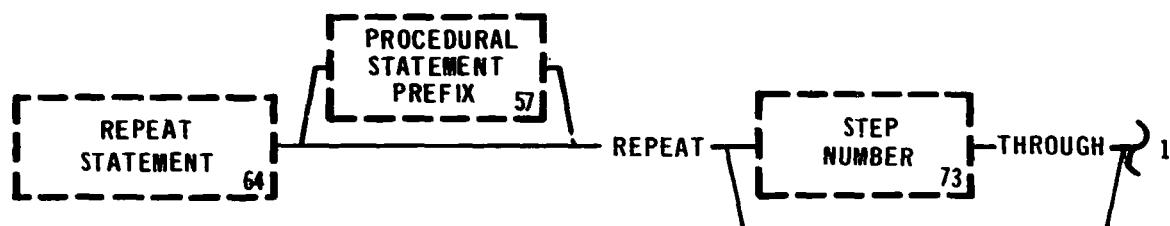
RELEASE



64
REV 0

REPEAT STATEMENT

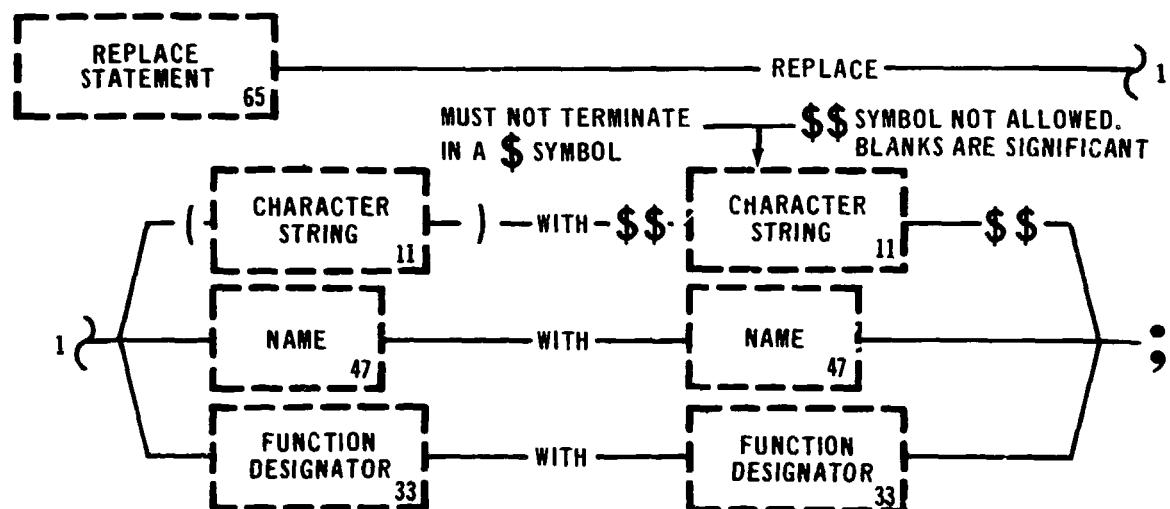
REPEAT



65
REV 0

REPLACE STATEMENT

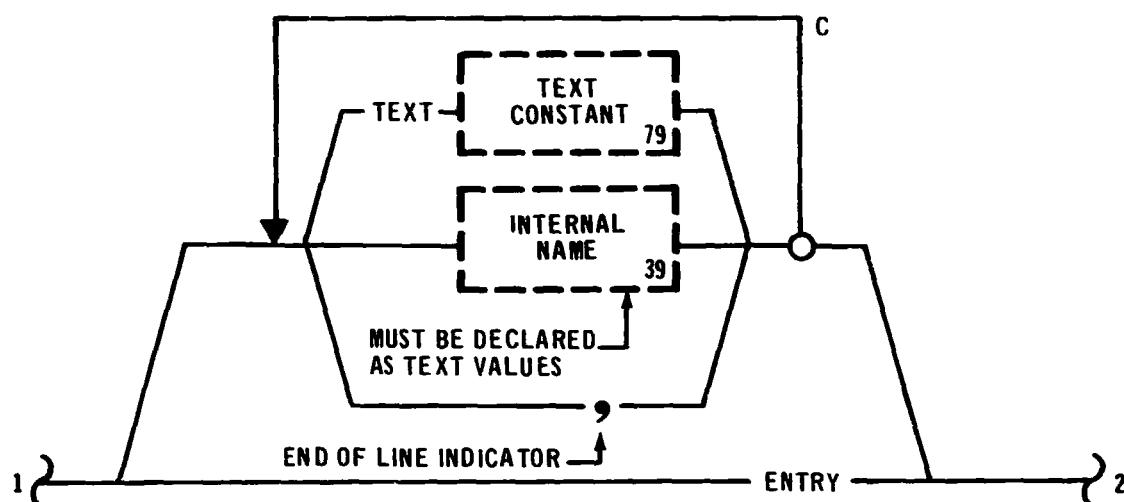
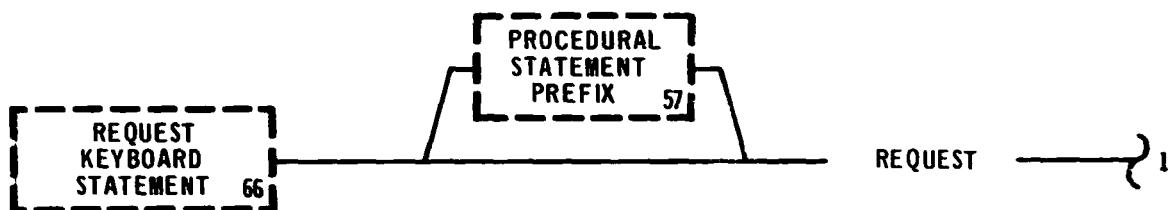
REPLACE



66
REV 0

REQUEST KEYBOARD STATEMENT

REQUEST

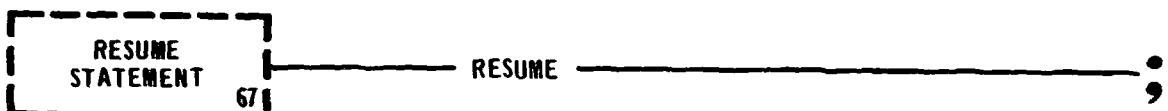


2 FROM FUNCTION DESIGNATOR 33 AND SAVE AS INTERNAL NAME 39 ;

67
REV 1

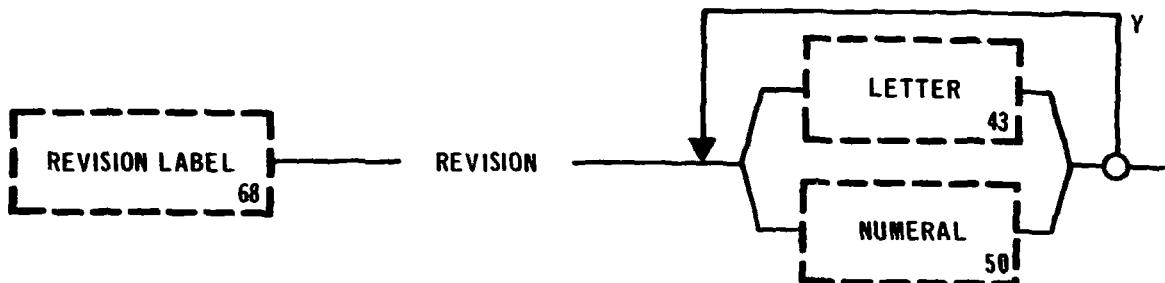
RESUME STATEMENT

RESUME



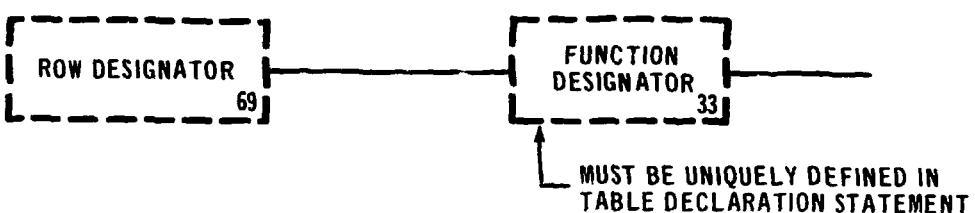
68
REV 0

REVISION LABEL



69
REV 0

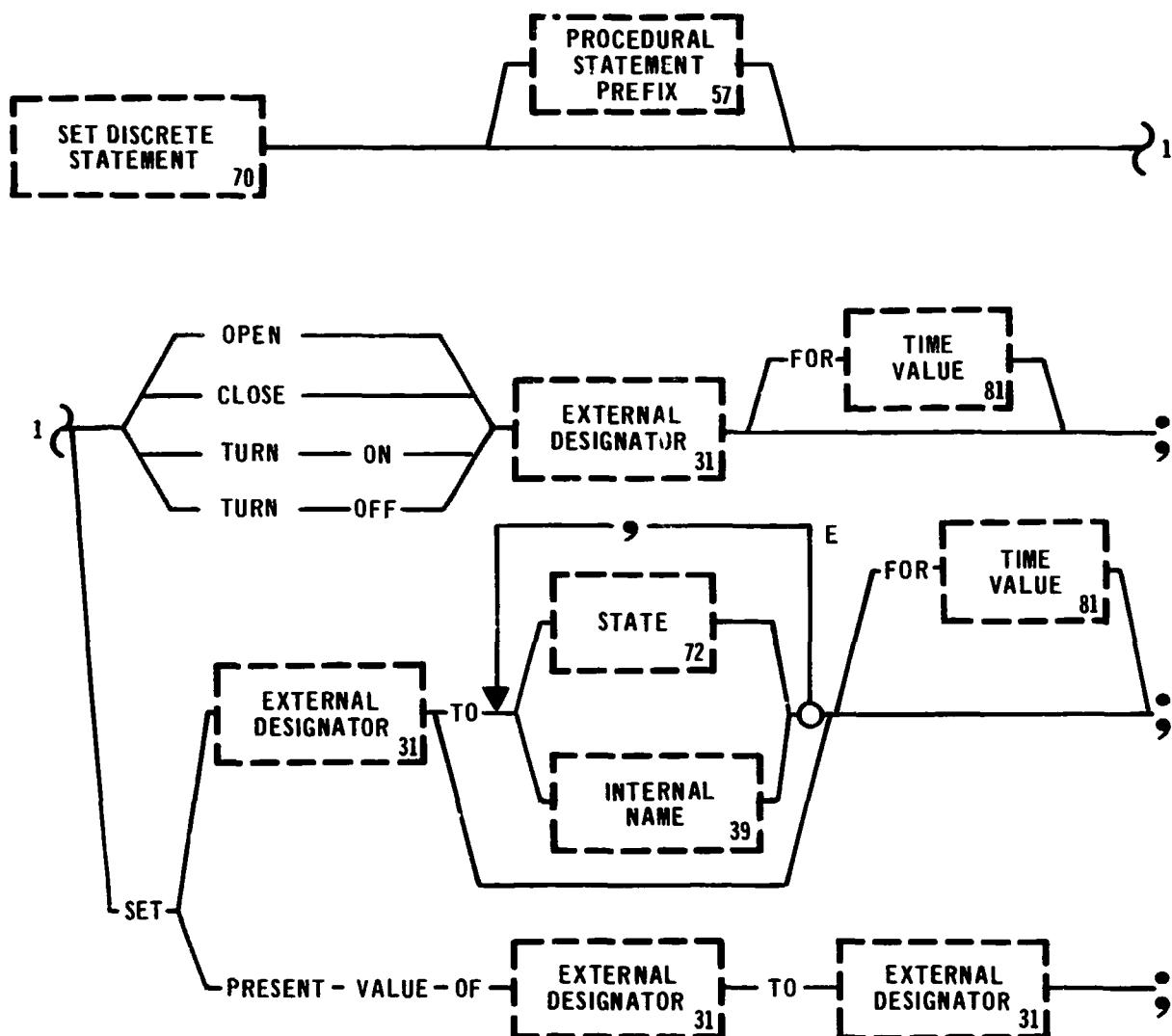
ROW DESIGNATOR



70
REV 0

SET DISCRETE STATEMENT

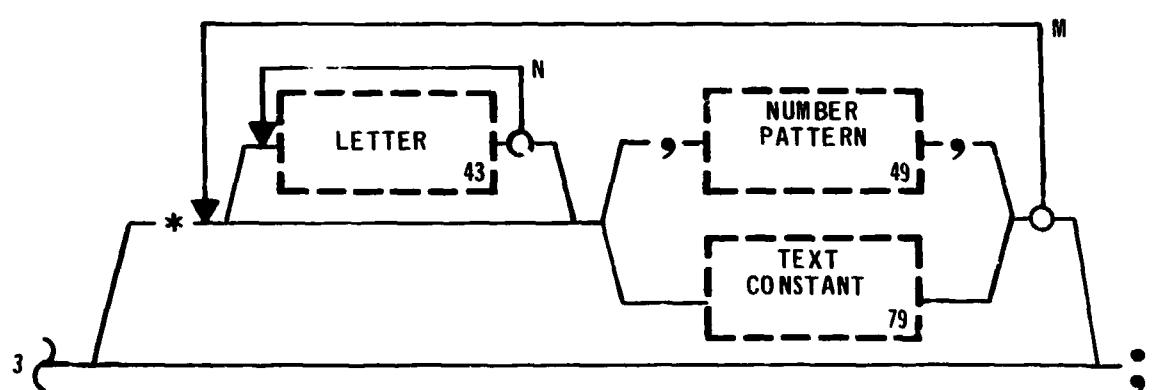
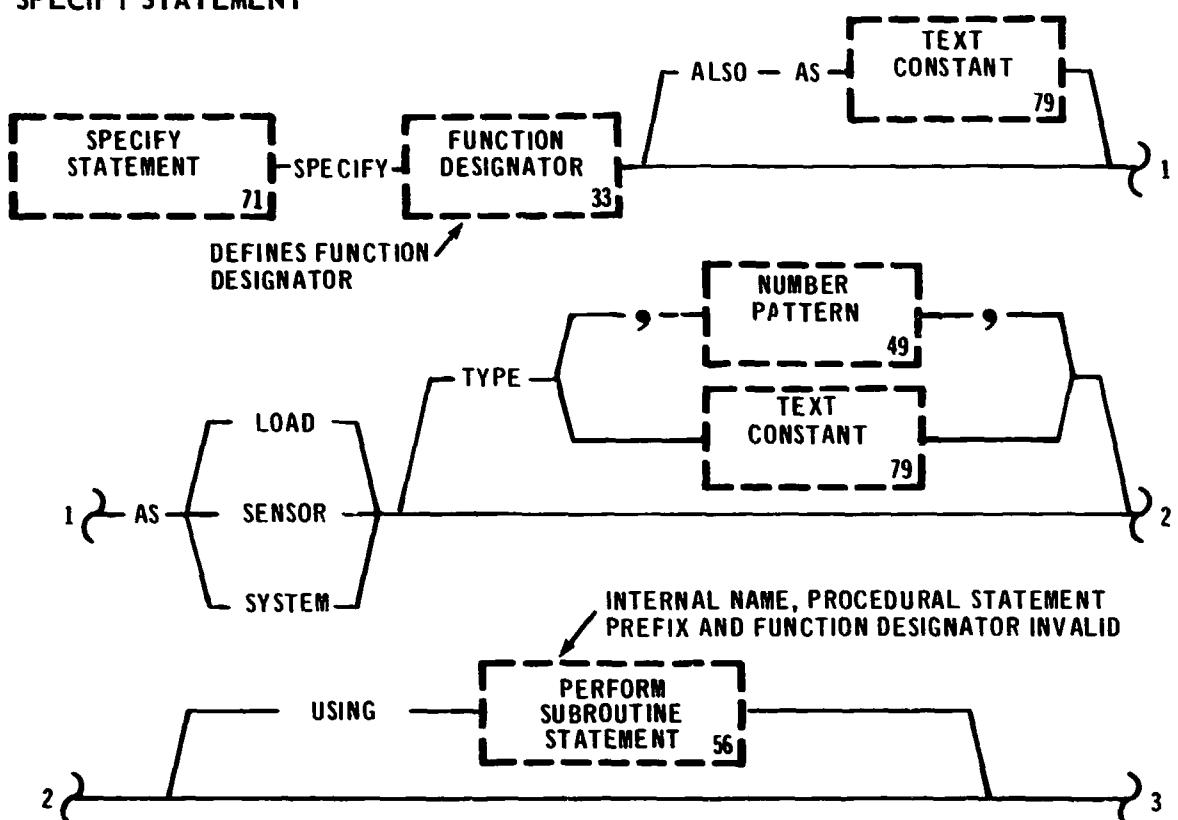
SET



71
REV 0

SPECIFY STATEMENT

SPECIFY



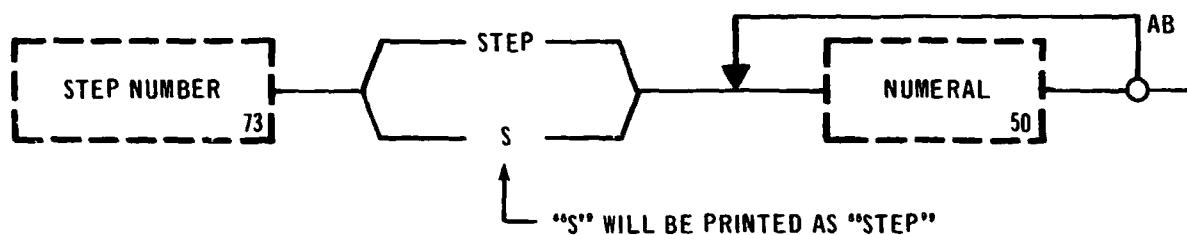
72
REV 1

STATE



73
REV 1

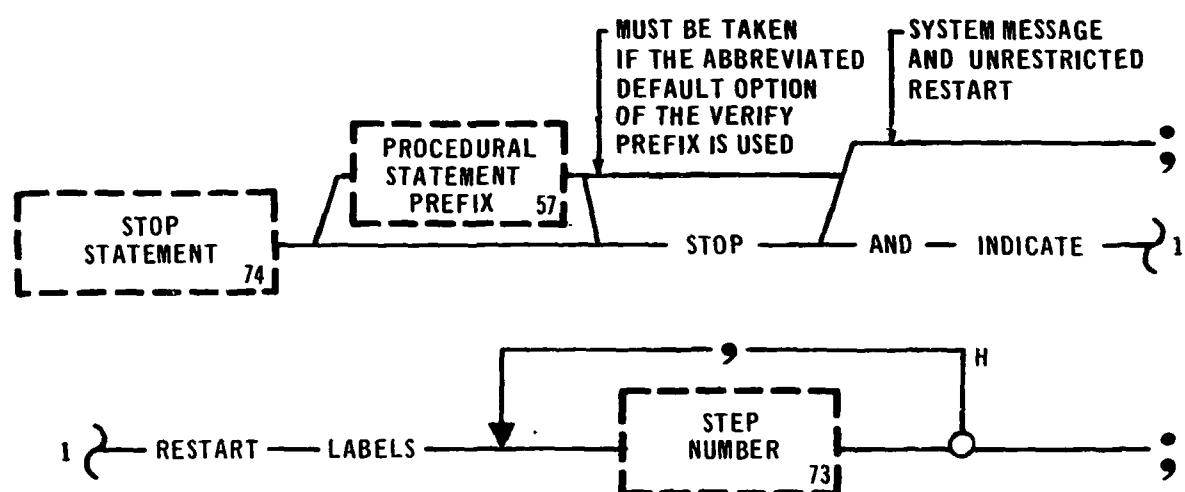
STEP NUMBER



74
REV 1

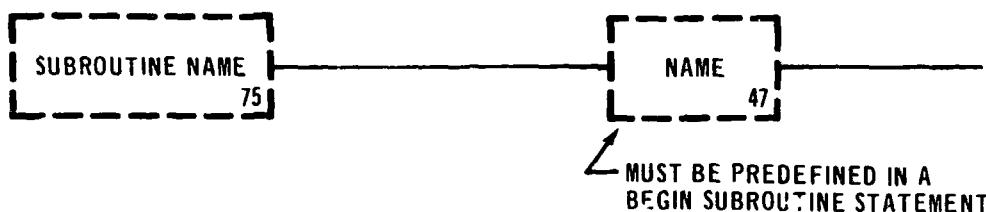
STOP STATEMENT

STOP



75
REV 0

SUBROUTINE NAME



76
REV 0

SYMBOL

SYMBOL	*	ASTERISK
		BLANK
	,	COMMA
	\$	CURRENCY
	=	EQUALS
	<	LEFT ANGLE BRACKET
	>	RIGHT ANGLE BRACKET
	-	MINUS
	(LEFT PARENTHESIS
)	RIGHT PARENTHESIS
	•	PERIOD
	+	PLUS
	;	SEMICOLON
	/	SLASH

77
REV 0

TABLE NAME

TABLE NAME

77

NAME

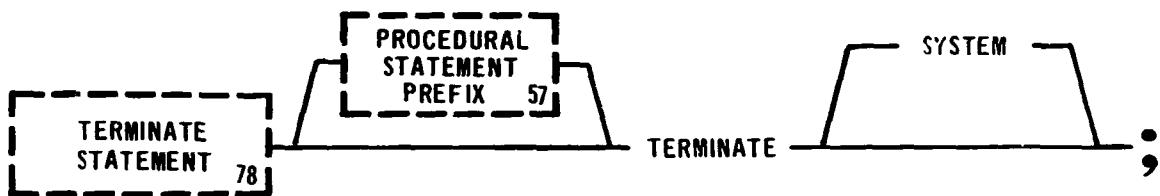
47

MUST BE PREDEFINED IN A
TABLE DECLARATION
STATEMENT

78
REV 0

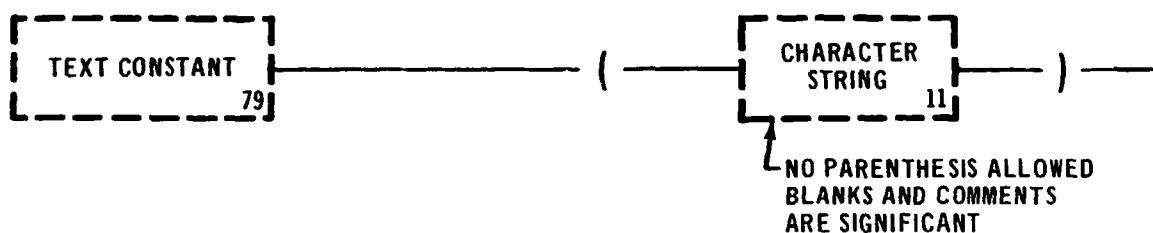
TERMINATE STATEMENT

TERMINATE



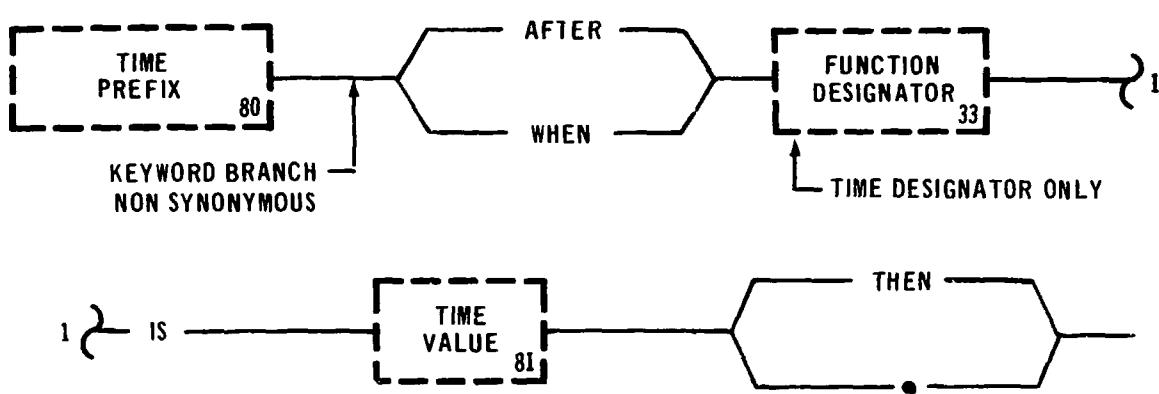
79
REV 0

TEXT CONSTANT



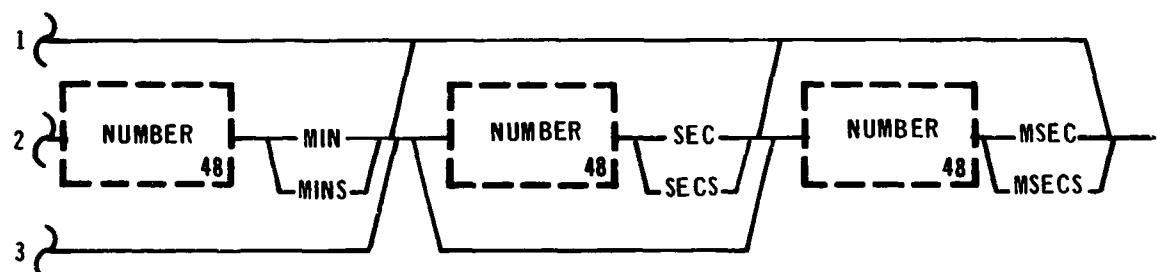
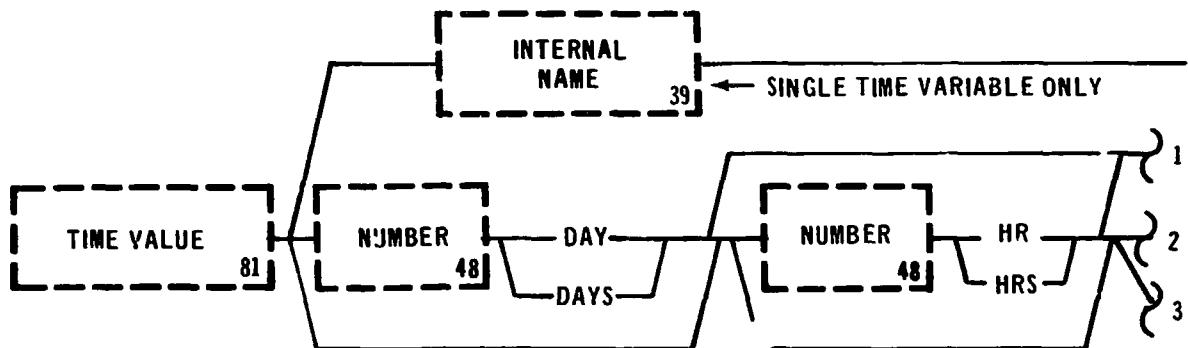
80
REV 2

TIME PREFIX



81
REV 1

TIME VALUE



82
REV 0

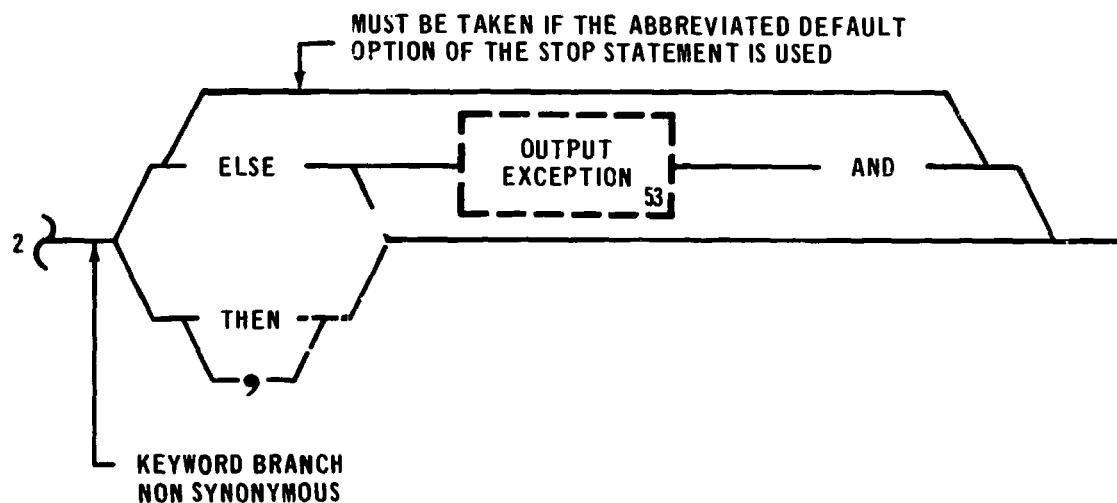
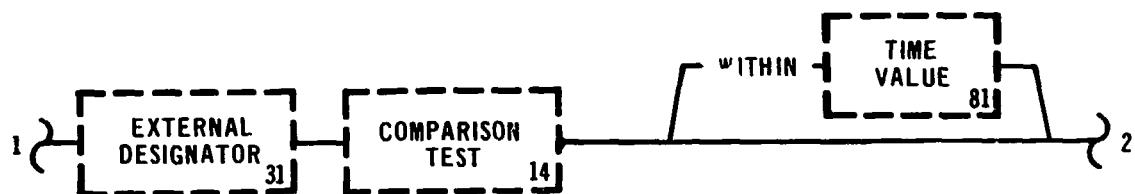
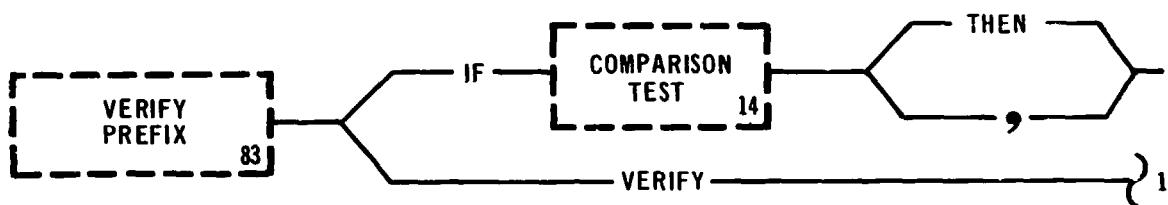
USE DATA BANK STATEMENT

USE



83
REV 1

VERIFY PREFIX



84
REV 1

WHEN INTERRUPT STATEMENT

WHEN INTERRUPT

